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GOODS FOR EXPORT

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as indicating that they are available for export

NOTICE TO SUBSCRIBERS

Consequent on the paper rationing, new subscribers cannot be accepted until further notice. Any applications will be put on a waiting list and will be dealt with in rotation in replacement of subscribers who do not renew their subscriptions

POSTING "THE RAILWAY GAZETTE" OVERSEAS

We would remind our readers that there are many overseas countries to which it is not permissible for private individuals to send printed journals and newspapers. THE RAILWAY GAZETTE *possesses the necessary permit and facilities for such dispatch.*

We would emphasise that copies addressed to places in Great Britain should not be re-directed to places overseas

TO CALLERS AND TELEPHONERS

Until further notice our office hours are:
Mondays to Fridays 9.30 a.m. till 5.30 p.m.
The office is closed on Saturdays

ANSWERS TO ENQUIRIES

By reason of staff shortage due to enlistment, we regret that it is no longer possible for us to answer enquiries involving research, or to supply dates when articles appeared in back numbers, either by telephone or by letter

ERRORS, PAPER, AND PRINTING

Owing to shortage of staff and altered printing arrangements due to the war, and less time available for proof reading, we ask our readers' indulgence for typographical and other errors they may observe from time to time, also for poorer paper and printing compared with pre-war standards

Moral Dividend Limitation

IN the House of Commons recently, Mr. Geoffrey Mander asked the Chancellor of the Exchequer if it was still the wish of the Government that companies should not pay dividends in excess of their pre-war rates. Sir Kingsley Wood replied briefly "Yes, sir." As *The Investors' Chronicle & Money Market Review* points out, neither the question nor the answer was free from ambiguity. The home railway companies, for instance, are paying dividends to junior stockholders in excess of those forthcoming in the years just before the war. Behind the question and answer, of course, was the old problem of "taking the profit out of war," which led to the imposition of 100 per cent. E.P.T. and the attempted Limitation of Dividends Bill. When that Bill was dropped, Sir Kingsley Wood substituted a moral obligation on companies to observe its spirit. In fact, even in the Limitation of Dividends Bill the Government conceded the right of companies which had not paid any dividend in the base period—any financial year ending after June 30, 1936, and before July 1, 1939—to distribute up to 4 per cent. and provided for higher payments when justified by "exceptional circumstances." This is a position which must be anomalous; indeed, because the whole of the circumstances at the present time is exceptional, this saving clause could be held to justify any dividend increase possible with 100 per cent. E.P.T.

The Reward of Capital and Labour

This form of moral dividend limitation reacts unjustly to the capital partner and the capital and labour partnership. The reward of labour is a constant factor—because labour cannot be hired without payment—whereas reward of capital is highly variable—good one year, absent the next; the necessary average without which capital cannot be raised is restored in times of great industrial activity like the present. The Government's attempt in its White Paper of July, 1941, to institute a "moral wages limitation" without the reserve sanction of 100 per cent. Excess Income Tax, has resulted in an advance in the wage rates alone to match the cost of living rise and an increase in earnings, between October, 1938, and January, 1943, of 65·1 per cent. "Candidus," in *The Investors' Chronicle & Money Market Review*, claims that the lesson is plain; moral limitation will not work unless backed by legal limitation, and if there is efficient legal limitation there is no need for moral limitation. He does not suggest that an Excess Income Tax would be practical politics, but he does suggest that there should be an end to humbug about "moral dividend limitation," and that within the confines imposed by E.P.T. and other taxation, companies should be permitted to do what they like with their own hard-earned money.

Government Control of Machine Tools

Under the Control of Machine Tools (Twist Drills) (No. 1) Order, 1943 (obtainable from H.M. Stationery Office, price 1d.), issued by the Ministry of Supply with effect from August 16, it has been made illegal for any person to place orders for high-speed steel twist-drills of certain standard types and sizes in quantities greater than those indicated in the schedule, during certain periods of six months, unless a licence is obtained. The procedure in respect of licences requires careful study, and the Machine Tool Control emphasises the fact that communications issued by it to the press and others can serve only as a general guide, to be supplemented by reference to the details contained in the Order. To deal with the new control, a Twist Drills Allocation Centre has been instituted, under the Controller of Jigs, Tools & Gauges, at Sheffield. Although the Order covers all high-speed steel twist-drills, the centre at first will deal with certain types only; notice of extensions will be given. The Machine Tool Control indicates that all users and resellers should review orders placed and should relate these to their stocks and to expected requirements, mutually agreeing cancellations with suppliers where necessary, and particularly where an order cannot be considered strictly necessary to the war effort.

Remarkable Coal Traffic by Rail

One of the most remarkable railway traffics of the war has been the supply by Germany of vast quantities of coal for use by Italian railways and industry. Even before Italy became a belligerent, there was serious interruption of the Italian coal imports as a result of the enforcement from March 1, 1940, of British contraband control of German coal consignments to Italy. This was not then a move against Italy, but was a ban on German exports as a reprisal against Germany's breach of international law by her unrestricted submarine campaign. Germany responded by undertaking to supply the whole of Italy's coal needs, 1,000,000 tons a month, and to deliver by rail. Many critics at the time "calculated" that this was a task impossible of achievement, but we pointed out that, as Italy imported 510,000 tons of coal from Germany by rail in February, 1940, the project did not seem wholly impracticable.

Despite the changes resulting from the progress of the war, it seems that something of the order of 10,000,000 tons a year has probably reached Italy by rail from German-controlled Europe, and some account of this traffic forms the subject of an article on page 191. The recent events in Italy have doubtless interrupted this flow of coal, and the military collapse of Italy would make the alternative supply of fuel to maintain the life of the country an immediate problem for the United Nations.

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Electric Railway Traction

Almost everybody, whether he be an engineer or not, is familiar with the early history of the steam railway engine to the extent of knowing that the first practicable main-line locomotive was the *Rocket*, attributable to George Stephenson. On the other hand, very few people, even among engineers, could say much about the efforts of the electric-traction pioneers. Their work did not produce an immediate and wide-spread revolution in transportation as did the work of George Stephenson; consequently it has received but scanty notice in the more popular and widely-read books about engineering achievements. Electrical engineers are naturally better informed than most about the early history of their particular science in its several applications, but even so the story of how electric trains came into being bears retelling; in the latest Faraday lecture, Mr. C. E. Fairburn, M.A., Acting Chief Mechanical Engineer & Electrical Engineer, L.M.S.R., gave members of the Institution of Electrical Engineers a concise and clear summary of the early history and subsequent development of electric traction, more particularly on railways. An abridged version of this lecture begins on p. 183 of this issue.

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Overseas Railway Traffics

The prospects of improved trade relations between Argentina and the United States have led to greater steadiness in the prices of Argentine railway securities. Since the opening of the new financial year on July 1 traffics of the British-owned Argentine railway companies have shown little expansion except on the Buenos Ayres Great Southern and the Entre Rios, although the increase secured by the Central Argentine for the 6th week goes some way towards reducing the previous decreases. The Great Western of Brazil and the Leopoldina continue to show improved receipts, and their respective gains in the period from January 1 to August 7, 1943, amount to £169,400 and £113,446, but higher costs and other commitments must be set against these advances. Antofagasta receipts up to August 8 are £195,420 better.

	No. of week	Weekly traffics	Inc. or decrease	Aggregate traffic	Inc. or decrease
		£	£	£	£
Buenos Ayres & Pacific* ...	6th ...	76,800	— 4,200	434,400	— 38,820
Buenos Ayres Great Southern*	6th ...	149,760	+ 31,500	735,360	+ 49,020
Buenos Ayres Western* ...	6th ...	44,280	— 2,280	242,700	— 22,620
Central Argentine*	6th ...	125,721	+ 8,931	643,032	— 38,472
Canadian Pacific	31st ...	1,132,600	+165,400	33,707,200	+4,148,200

* Pesos converted at 16⅔ to £

It is exceptional nowadays for the United of Havana to show a reduction in traffics, but in spite of the decrease of £4,297 in the 6th week of the financial year the aggregate gain is £52,515.

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Bolivar Railway Finance

The Bolivar Railway of 136 miles on the 2 ft. gauge has had since March 22, 1942, through railway communication with the Puerto Cabello & Valencia Railway of 34 miles on the 3 ft. 6 in. gauge, by means of the opening on that date of the Palito-Palma Sola line of 33½ miles on the 3 ft. 6 in. gauge, constructed by the Venezuelan Government. Both the Puerto Cabello and the Palito lines are worked by the Bolivar Railway Company, which records a substantial increase in through goods traffic during the year 1942 as a result of the new connection. Traffic was also stimulated by the continuing diminution of road transport competition, and the upward trend of receipts has been maintained during the current year. This development, however, has found the working company with insufficient engine power and without capital resources or liquid reserves to meet the cost; current revenue has had to bear the charge. This matter, among others, has led the board of the Bolivar Company to the conclusion that some re-arrangement of finances should be considered, and, in view of the improved outlook, a reorganisation of the company may be undertaken.

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Dimensions of Public Service Vehicles

For many years operators of public service vehicles have considered that there was need for less restrictive regulations governing the dimensions of public service road vehicles, such as buses, coaches, and trolleybuses, but pre-war approaches failed to secure the approval of the Ministry of Transport. More recently the Associated Road Operators, the Commercial Motor Users Association, the Municipal Passenger Transport Association, and the Public Transport Association, reopened the matter and prepared a memorandum setting out those revisions which they considered were desirable. The memorandum was submitted to the Society of Motor Manufacturers & Traders for the support of the society, in order that a joint approach, representative of both operators and manufacturers, might be made to the Ministry of War Transport. Recently, a meeting was held between representatives of the operators' organisations and of the Commercial Vehicle Committee and Body Builders' Section of the Society of Motor Manufacturers & Traders at which agreed proposals were formulated. At this stage the proposed revisions of the regulations concern overall length, overall width, overall height, and weight, but it is recognised that, if the approval of the Ministry is obtained for the proposed revision of these regulations, consequential amendments of other regulations will be necessary. A technical sub-committee has been set up to finalise the representations which are to be made to the Ministry, and the representatives appointed to serve on this are recorded in our Personal columns, page 187. The use in war conditions of road vehicles built in this country for service overseas, of larger dimensions than are normally permitted here, has demonstrated the practicability of some permanent relaxation of the restrictions, and has made the present time suitable for reopening the matter.

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Government Locomotive Building in Chile

The Chilean Government is credited with the intention of establishing a large engineering and locomotive works at Talcahuano, a port to the south of Valparaiso. It is said that the machines and equipment of the Talcahuano naval arsenal are to be used, presumably after the war. In the share capital of the company which is to be founded for the purpose, the Government is to have the majority holding, amounting to Pesos 1,500,000,000, while Pesos 300,000,000 will be owned by the semi-official Corporacion de Fomento de la Producion (Production Development Corporation). Pesos 50,000,000 will be left to private concerns interested in the venture. It may be recalled that the naming ceremony of the first locomotive to be built in Chile entirely from domestic materials and by Chilean workmen took place in the San Bernardo shops of the Chilean State Railways on November 21 of last year. This locomotive, which was given the name *Juan Antonio Rios*, in honour of the President of Chile, who, with several Government ministers, attended the ceremony, was assembled in 36 days, despite lack of equipment for turning out parts in quantity. It was sent to the Chilean Exposition & First International Sample Fair in Santiago, with other types of rolling stock and equipment, all built in Chile. The hope was then expressed that other locomotives would be constructed, but press reports indicated that this could not be done until after the war, because all available raw material was needed for rolling stock repair.

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Road Transport Dependent on Railways

As the U.S.A. is one of the major sources of petrol supply for the world, it is apt to be overlooked that fuel restrictions are quite severe there as elsewhere, mainly because of the difficulties of distribution. Petrol and diesel oil depend primarily on railway transport for their distribution, and pipe lines and road tankers are still a secondary means. In fact, the Burma Road and the Alaska Military Highway provide outstanding examples of road self-sufficiency, and operations on each have indicated that long-distance fuel distribution by road is far too costly for commercial purposes, and can be essayed in wartime only as a strategic necessity. It is not too much to say that wartime experience in supplying road fuelling stations by long-distance lorry or tanker has provided a decisive answer to the question that has been debated for many years past, giving a clear negative to the suggestion of some road transport enthusiasts that, once adequate roads are available, railways can be dispensed with. Fuel, whether in the form of coal or oil, has proved a commercial bulk-transport proposition only to rail and water. As the time and labour which would be involved in the construction of a railway to Alaska prevents such a step providing an immediate solution to the fuel problem of the Alaska Military Highway, a 400-mile pipe line and refinery are now being built under a scheme described at page 189.

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French Electrification Schemes

It is indicated from neutral sources that the severe shortage of coal is redirecting the attention of the authorities in France to the necessity for completing part at least of the electrification scheme drawn up by the National Railways in 1938, work on portions of which was resumed in 1941. As was stated in our May 21 issue, conversion of the Brive—Montauban line is expected to be completed by the end of this year; this will close the 100-mile gap in electrified routes extending *via* Central France from Paris to the Spanish frontier at Port Bou. Other

lines included in the programme are those from Bordeaux *via* Agen to Montauban, and from Sète *via* Montpellier to Nîmes. In addition, preliminary work in connection with the electrification of the Paris—Lyons main line is stated to have been completed, although reports indicate it to be unlikely that work on the Paris—Dijon section will be proceeded with during the war. In view of the shortage of materials it would appear advisable to accept with reserve reports that the line from Paris to Nîmes *via* Montargis, Nevers, Vichy, and Clermont-Ferrand forms part of the current conversion programme, as well as the routes between Lyons and Marseilles *via* Avignon; Marseilles and Menton; and Lyons and Geneva *via* Aix-les-Bains.

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Improving the Bouré Key Interlocking

Many of the wayside stations in France have long been fitted with a system of key interlocking devised nearly 50 years ago by an inspector named Bouré on the P.L.M. Railway. It rapidly became popular, so much so that within 4 years there were over 250 stations fitted on one line alone. French operating principles influenced signalling practice in Spain, where, however, the adoption of interlocking made rather slow progress for some time. The Bouré key system spread to Spain and is still found at many stations. It is simple and cheap to instal and is fairly satisfactory where there are comparatively few movements each day requiring points to be operated. There is nothing peculiar in the principles of the system, but certain items of the equipment had novel features at the time they were introduced. One of the civil engineers of the Spanish National Railways, Señor R. Camara Niño, has recently described an improvement effected in the form of the central apparatus employed with the Bouré working, intended to make it less cumbersome and enable it to be manufactured with less material. The alteration amounts to giving the horizontal signal- or route-bars a left and right movement and fitting them with keys and locks at each end. The vertical point bars remain the same but the need for additional special locking bars is rather less than before. The overall size of the apparatus is about halved.

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Testing the Operation of Electric Contacts

The constantly-increasing part played by electric contacts in all phases of industrial life, including railways, makes the study of their behaviour under varying operating conditions of great importance. The selection of the right type of contact, its shape, the materials, and areas of the contact-making parts, the force applied to maintain it closed and so on, is something which can make or mar a piece of equipment otherwise very satisfactory. Circuit designers rightly seek to do with the minimum of contacts consistent with achieving their object, but even then the number is often appreciable and too much attention cannot be given to obtaining complete adaptability to the function each individual contact is called on to fulfil. Considerable investigation has been devoted to this question and our contemporary, *The Metal Industry*, has recently published a description of a machine designed in America and arranged to put a prolonged service test on contacts working over a suitable range of power, enabling the comparative merits of the different forms to be established experimentally. An interesting system of check circuits shows when contacts become defective, or weld together, for an interval or in permanence, registers bounce and other working features.

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London Transport Clocks

Some idea of the magnitude of the task provided by Summer Time changes, such as that of Sunday last, is given by the fact that the staff in the London Transport clock maintenance shop is responsible for nearly 3,000 clocks. There are 1,150 at garages, depots, and works; 1,600 at Underground stations; and 171 time-recording clocks along bus routes. The staff also maintains approximately 1,100 watches, used by railway guards and by road service staff. The average number of watches repaired is 40 a month. Two watchmakers are employed, one of whom also supervises the work on the clocks. Three women employed in the Clock Shop had no previous experience in this type of work, but have now been trained so that they can take a clock entirely to pieces (a clock can contain as many as 200 parts), clean it thoroughly, and partly re-assemble it. Skilled men undertake the final assembly and adjustment. The units handled include electric clocks, mechanically-operated clocks, self-winding clocks, and time-recorders. Three more women are employed as clock winders. They travel on a regular rota to the 171 roadside time-recording clocks, which they re-wind once a week. They also change the ribbon used for stamping the time cards. In addition to repair work this shop makes parts for clocks, as certain parts cannot now be obtained.

Transport and Full Employment

THIS is the fourth* of our special articles on general principles for public transport after the war. Considerable attention is being given in many quarters as to the possible means of controlling the trade cycle to prevent, as far as possible, trade recession. There are many ways in which public transport (and the railways in particular) can help to stimulate employment. Some of them have been mentioned already, notably in the elimination of peaks, which would meet the requirements of organised leisure on the vastly increased scale expected.

General trade slumps (as distinct from seasonal depressions) usually occur once or twice in every ten years. Between the wars there was a boom in 1920, a depression in 1921, a boom in 1929, a depression to 1932, a gradual rise to a boom in 1937, and a recession again the next year. The average length of a cycle appears to be about seven years. When all the fluctuating factors have been removed, railway freight traffic reflects the general trade cycle: it goes down in depressions and up in booms. No records are available as to road freight traffic, but it would probably show the same tendency. The obvious general cause is the slowing down of the machinery of production, primarily caused by the curtailment of investment in capital goods and of export trade. There are a variety of reasons for it, physical and psychological. The lapse of new ventures, exploitation of inventions, and improvements, are some of them; they seem suddenly to accumulate together and set up an impulse that starts a decline. The downward swing in particular industries contracts the money income available to the people attached to them. This entails a downward swing in the demand for the products of other industries. Soon the thrust becomes generalised and general depression sets in. There is a drop in the money demand for labour, and as wage rates are rigid, employers contract their labour force and there is unemployment. This is a highly simplified description of a malady, the causes of which are highly controversial, but at any rate it happens in a state of perpetual motion and with a host of conflictions.

Now the question is, can public transport, a nationwide service, contribute still further towards a solution of the problem? There appear to be two main ways: new works (or investment in capital goods), and the manipulation of transport charges. Consider, first, new works. It is well known that before the war the railways undertook extremely large schemes of new works designed to stimulate employment. This was in 1935, but it is not generally realised that as far back as 1924 they met a Government request to embark on schemes which otherwise would not then have been undertaken. Altogether, between 1924 and 1938 the railways and L.P.T.B. undertook new works directly to stimulate employment amounting to about £130 million. This was, of course, apart from the huge expenditure on other works. The schemes which probably have most bearing on the post-war problem (because of the satisfactory machinery set up) were those undertaken in 1935 and which were not completed when war broke out.

It is sometimes said that it is necessary for investment works of this kind to be undertaken by the Government and that for this reason transport should be owned by the State. This can be judged in relation to what was done before the war. The principles on which the works were undertaken in 1935 were that the expenditure should (*a*) be substantial in amount, (*b*) be capable of being undertaken quickly, (*c*) provide new public services of definite value, and (*d*) require assistance in obtaining funds if done then. As to the first principle, the cost of the works in London and elsewhere totalled £69½ million; the second was covered by the stipulation that the works should be completed in five years; the works themselves ranged from new tubes and electrification of surface sections to the construction of stations and rolling stock; and as to the last principle, none of the works would have been undertaken then but for the fact that the lower interest cost (about 3 per cent., net) made them commercially possible.

In the case of the London area works, the Government stipulated that they should be limited to those chargeable to capital; but elsewhere the main-line railways could not agree to such limitation and a new and somewhat restrictive formula had to be found providing for the works being chargeable to capital or revenue as the case might be. The Government may have had other reasons for wishing to confine the works to those chargeable to capital, but it is obvious that whether works are chargeable to capital or revenue is immaterial to the main object of creating employment; there should be no similar refinement in post-war schemes.

The actual method of working the whole plan was as follows:—A loan company was formed with a nominal capital

* "The Future of Transport," June 18; "The Problem of the Peaks," July 9; "Transport and its Track," July 23

and with power to borrow the money required under a Government guarantee for a stipulated period; in turn the loan company lent the money to the railways and L.P.T.B.; the latter provided security in the form of debenture and transport stock. The whole of the machinery covering the transactions is to be found in the agreements made between the Treasury and the railway companies and L.P.T.B. One of the clauses provided that Treasury approval of the works was to be obtained as to suitability, they were to come under the usual obligations as to fair wages and use of United Kingdom manufactures, and preference was to be given to firms in the distressed areas. Detailed returns had to be supplied to the Ministries of Transport and Labour; for example, full information was given as to the workmen employed, including those of contractors and sub-contractors.

It will be seen that as to timing and execution, the 1935 projects were an extremely valuable precedent and were successfully undertaken by private enterprise working in collaboration with the Government. There is no doubt that after the war the procedure can be worked again just as successfully, and the timing left to the Government. Given a suitable interest cost, the railways should be capable of spending further large sums on works providing public services of a definite value to the country. A word of warning, however, is necessary. The power of the railways to assist in this way will be conditioned by the policy of the Government in relation to public transport generally; there must be a plan which will remove the competitive difficulties experienced by the railways between the wars. As we have said many times in this series: transport must be planned as a whole, and no sectional interest ought to be allowed to stand in the way. All new works (including the construction of new roads) should be considered in relation to a general transport plan and not in isolation. In the nature of things, many of those now concerned with transport will not be in harness when the new era is ushered in; theirs is therefore a very grave responsibility in the national interest, and we do not doubt they will rise to it.

In addition to new works, it is worth considering if transport charges can play a similarly important part in employment policy. The root is the assumption that freight charges of all forms of transport will be brought in harmony under a general system of statutory regulation with a common basis (or bases). That is to say, that public transport will be able to give its full attention to providing the best service at the lowest economic charge. It has been suggested that if the State budgeted for a surplus in good times and for a deficit in bad, this would leave more money to be spent in times of depressions. This is not unlike the idea of increasing railway charges on upward curves and reducing them at the start of depressions. If the yield from the increases for this specific purpose could be transferred to a pool, the money could be applied in the reduction of charges to counteract slump tendencies.

Such a plan has many difficulties and much would depend on the co-operation of traders. The administering of the pool might be undertaken by the Railway Rates Tribunal, as under the Railway Freight Rebates Scheme. If instead of taking the transport accounting period as a single year it covered the trade cycle (say seven years) and gave a reasonable result on the average, it might not matter. It is realised this would reverse the policy hitherto adopted of stabilising transport charges, and, in the case of railways at any rate, of aiming at increasing them in bad times to reach a standard revenue (though the latter could still remain as the modest standard required for efficiency); these factors would need to be set against the background of the larger issue.

It is interesting to note that in the document by Lever Bros. Ltd. on "The Problem of Unemployment" issued last January, the following paragraph appears:—

> "Under the system of a single budget, balanced annually, taxation is imposed at a higher rate in times of depression, at a lower rate in times of prosperity. The procedure should be the reverse. In booms the Government's policy should be to check spending; in slumps to encourage it. As an example, extensions of productive capacity incurred in periods of boom might have to suffer reduction or abolition of depreciation allowances, or even direct taxation; whereas such extensions incurred in periods of slump might be allowed as a set-off against income. A system of two budgets should be introduced. An 'ordinary' budget, balanced annually, for meeting standing expenditure out of current revenue; an 'extra-ordinary' budget to meet normal capital expenditure and such emergency measures as should be taken in times of depression to fight unemployment or stimulate trade. The 'extra-ordinary' budget would be covered—or over-covered—only in times of prosperity."

This is the same idea as that suggested above for transport charges and finance. The timing of charges adjustments would be a problem; it would need more accurate forecasting than has yet been attempted in the transport industry. But with all the extensive studies of the employment question now being undertaken it is not too much to hope that the Government will be able to evolve a plan for forecasting cyclical changes with some accuracy so that remedies, possibly on the lines here suggested, can be applied promptly.

Wagon Economy in India

THE ever-increasing demand of the War Department for more railway wagons is causing the Indian railways, in common with most others throughout the world, to make special efforts to secure better wagon loads, and in other ways to achieve a more economical use of rolling stock. A pamphlet issued by the Indian Railway Board entitled "Do's and Dont's of Railway Transport" emphasises that the ability of a railway system to move traffic is limited by the three main factors of line capacity, motive power capacity, and wagon capacity. The first and second items are completely outside the control of railway users, but wagon capacity is affected materially by the helpfulness or otherwise of shippers. In this connection, the pamphlet stresses such points (already familiar in this country) as the need to see that a wagon is given a full load; that use is made of local materials, and railway transport used only when other means are not available; that the rate of despatch is related to the unloading capacity of the destination; that despatching instructions are clear, and all goods clearly and adequately labelled; and that wagons should be unloaded immediately and not used as warehouses. The carrying capacity of a broad-gauge (5 ft. 6 in.) wagon in India is about 20 tons.

The number of public service wagons (in terms of four-wheelers) in the broad-gauge wagon pool at the end of the financial year 1941-42 was 151,300, or 1,485 fewer than at the end of 1940-41. The total number of wagons loaded during the year was 5,056,584, a decrease of 29,735 wagons or 0·59 per cent. compared with the previous year. The highest daily loading was registered in the ten-day period ended April 10, 1941, when an average of 15,462 wagons were loaded daily. The highest average daily loading in the previous year was 16,196 wagons in the period ended January 31, 1941, and the highest daily loading on record is 17,339 during the period ended February 29, 1940. Demands throughout the year exceeded the available wagon supply. The number of wagons temporarily out of service on all broad-gauge railways varied between 5,633 and 7,716. In the metre-gauge wagon pool the number of public traffic wagons on March 31, 1942, was 44,846, or 5,365 fewer than at the end of 1940-41. The heaviest loading was recorded during the period ended February 10, 1942, when an average daily loading of 7,253 wagons was attained. The highest daily loading recorded previously was 8,882 in the period ended February 29, 1940. In view of the release of a substantial number of wagons for service overseas, the resources of the pool were reduced considerably.

In the financial year 1941-42 there was a radical change in the general rates policy of Indian railways. Instead of canvassing for traffic, the railways were obliged to adopt a general policy of discouraging movement by rail. Cheap rates for goods traffic in competition with rival transport services, or for developing traffic, were mostly cancelled. Particular attention was paid to restricting the carriage of non-essential commodities, and eliminating avoidable long hauls by diverting the traffic to shorter routes, and by quoting special rates to prevent re-booking. In the last-named connection, the pamphlet to which we have already referred says: "Don't re-book—settle the destination beyond doubt before booking. Changing one's mind is a woman's privilege and you are doing a man's job." The usual practice of the railways, when quoting rates lower than the ordinary classified rates, has been to attach minimum weight conditions; there were, however, a few exceptions. For instance, in the case of grains, pulses, and seeds common, reduced rates applied equally to traffic in small lots as well as in wagon loads, while in several other cases the minimum weights, fixed more in consideration of the peacetime requirements of the trade than of operational economy, resulted in poor use of wagon space. With the rapidly-increasing demands for the transport of essential war and supply requirements, it was necessary to eliminate all causes contributing to light loading of wagons. The Indian Railway Conference Association was requested to examine this question very carefully, and on its recommendation railways took the following action for ensuring better wagon usage: (*a*) minimum weight conditions were attached to reduced rates quoted for commodities like grains, pulses, and seeds common, etc., which were not previously subject to any such conditions; and (*b*) minimum weight conditions applying to the reduced rates quoted for several commodities were enhanced. A further step was to impose the usual increased charge of 2 annas per rupee to consignments of food grains moving in small lots. The

exemption from the increased charge which consignments of food grains have enjoyed since the inception of the charge, however, continues for traffic moving in full wagon loads.

Another expedient which is being adopted to secure wagon economy is to revert to the system previously in force on the North-Western Railway of India, and to re-open as re-booking stations as many of the original transit sheds as is practicable. The earliest of these stations to be so re-opened were Kundian, Malakwal, and Lala Musa, which have been working very satisfactorily. Lala Musa Transit, for instance, was re-opened from July 10, 1942. The working for four months ended October 30, 1942 showed the very satisfactory result of 709,800 wagon-miles (or 177,700 wagon-miles a month). Encouraged by this, other transit stations have been re-opened, with these results:—

(1) Kasur from December 1, 1942: 52,558 wagon miles up to December 31, 1942;
(2) Ferozepore from December 1, 1942; 68,069 wagon miles up to December 31, 1942;
(3) Ludhiana from December 15, 1942; 235,423 wagon miles up to January 31, 1943;
(4) Wazirabad from December 31, 1942; 82,148 wagon miles up to January 31, 1943;

As these transit stations continue to settle down under their new conditions of working, still better results should accrue. We understand that three other transit stations on the North-Western Railway system have been (or are about to be) opened, and that others are under consideration.

The Scope of the Baker Valve Gear

CORRESPONDENCE which we have received since the publication of our article on the Baker valve gear in our June 11 issue, shows how keen an interest is taken in the subject of steam distribution, and how anxious locomotive engineers are to give consideration to alternative forms of valve gear, in any instance where their adoption, on general grounds, would be economically justifiable. The way in which steam is supplied to, and exhausted from, the cylinders, is still considered one of the principal fields in which there is work yet to be done in connection with the improvement of the overall efficiency of the machine. Here, indeed, the Baker valve gear comes on the scene as a serious contribution to the achievement of the object in view, and because of its remarkable claims, and the virtual absence of disadvantages—at any rate in published literature—it is worth examining the directions in which its adoption has been most marked and comparing them with other spheres in which it has made comparatively little progress.

According to the "Universal Directory of Railway Officials,"* there are 43,362 steam locomotives in the U.S.A., which admittedly is the principal country where the Baker valve gear is to be found. If some 14,000-15,000 locomotives (as is claimed) have been fitted with it, one would expect to find about one engine in three supplied with this gear. Is that indeed the case? It must, however, be remembered that the total number of engines to which the gear has been fitted is not the same as the total number of engines running with the gear; earlier examples no doubt have been scrapped; and others may be modified by the provision of poppet-valve gears—especially in view of the encouraging results with the latter, which Mr. G. W. Alcock recorded in a paper presented to the Institution of Locomotive Engineers on June 10, 1943.

As far as we can judge, the Baker valve gear has found favour chiefly on locomotives intended for heavy long-distance passenger or freight trains working under fairly well-ascertained conditions. For the "mixed-traffic" type of work, or for shunting and local traffic, the Walschaerts gear is almost universally fitted. The Baker gear gives best results with large-diameter piston valves which have long travel (for example, 12 or 14 in. dia. and 8½ in. maximum travel) which are commonly fitted to the main-line 4-6-4 and 4-8-4 types. When we look at machines which are intended for the other categories mentioned, or to be "maids of all work" the Baker gear is yet comparatively rare.

The excessive number of joints and pins in the various components of the motion may have been a deterrent to engineers considering the adoption of the Baker gear in this country; and little wonder, for the routine conception of pin joints for motion linkwork in this country is a simple, solid, case-hardened, and ground pin, as often as not without even a hardened bush in which to work. Such a construction applied to the Baker gear, though it would give good results at first, would after a few months' intensive wear, possess enough "slogger" to give a seriously incorrect steam distribution. The remedy is to employ, as far as possible, needle roller bearings. We understand that the improvements in the Baker gear which have been introduced by the Pilliod Company, of New York, include the substitution of needle roller bearings for pins working in bushes, at a number of points in the motion; and it is claimed that such roller bearings have a longer life, with less wear, under sustained heavy or intermittent shock loads.

The use of such bearings undoubtedly enhances the value of the Baker gear very greatly and will, we believe, obviate much of the "lost motion" which would otherwise arise through a multiplicity of joints. We cannot but feel, however, that if such improvements have contributed to the success of the Baker gear, they might be well worth investigation—and indeed adoption—in connection with all locomotive valve gears.

* 1942-43 edition, p. 468

Bessemer Steel in Railway Service

ONE of the results of the 1914-19 war was the almost complete extinction in Great Britain of steel production by the Bessemer process. Until then, the basic Bessemer process, the cheapest mass production method of steelmaking, had had a limited vogue, chiefly on Tees-side, but Cleveland iron proved unsuitably impure and high in phosphorus for conversion by this means, and the brittleness and uncertainty of the resultant product, rails in particular, gave basic Bessemer steel so bad a name with British engineers that in the 1922 revision of the British Standard rail specification, basic Bessemer was no longer included as a permissible method of making rail steel. In consequence of this and other adverse measures, the basic Bessemer process became extinct in this country. Subsequent events have thrown doubt on the wisdom of this drastic step. The reintroduction of the basic Bessemer process at the large new Corby works in Northamptonshire, chiefly for the purpose of making tube steel, has proved that with iron smelted from the ore-beds of this and adjacent Midland areas it is possible to make a reliable basic Bessemer steel from British raw materials.

Similarly the Luxembourg and Lorraine ores, such as minette, have been well suited always to basic Bessemer steel production, and British railways which were compelled by the high prices of rails in Great Britain in 1921 temporarily to buy basic Bessemer rails from Luxembourg had no cause to regret their purchase on quality grounds. Actually the effect of the 1922 basic Bessemer deletions from the standard specifications was to tie the hands of British manufacturers, for thousands of tons of cheap Continental steel were subsequently imported into Great Britain at prices with which British makers could not compete; and on the showing of Corby much of that steel might have been made in this country. Adequate research directed towards the making of a reliable basic Bessemer steel might thus have been more in the national interest than this attempt to exclude an economical steel process so firmly established on the mainland of Europe.

These reflections are prompted by the fact that in the United States, under the compulsion of war shortage, the War Production Board has now laid it down that in the manufacture of certain details of railway equipment the railways must be prepared if necessary to accept Bessemer in place of open-hearth steel. The list of such material covers 66 items. It includes flat-rolled plates less than $\frac{7}{16}$ in. thick and rolled sections which are not to be subjected to high stresses, dynamic shocks, cold flanging, or other drastic treatment in being formed to finished size or shape. On locomotives the items listed are mostly externals, such as side sheets, dome covers, cabs, and so on; in coaches and wagons Bessemer steel is to be used, if required, for side sheets, roof sheets, diaphragm web plates, and similar purposes.

No distinction is made in the W.P.B. order between acid and basic Bessemer steel, but the limitations laid down seem to make it clear that the acceptance of basic Bessemer steel is contemplated, for in any event acid Bessemer steel has nothing to fear on reliability grounds in comparison with the open-hearth product. The reliability of acid Bessemer steel is founded on the fact that it is made from hæmatite iron, smelted from pure hæmatite ores from which no phosphorus needs to be removed. In this country practically the only hæmatite ore is found in West Cumberland and North Lancashire, and it is for this reason that the only remaining production of acid Bessemer steel in Great Britain is on the Cumberland coast, which has achieved a high reputation for quality, especially in the matter of rails. In the development of post-war trade, however, it seems desirable that the whole question of Bessemer steel should be re-examined.

NEW BRITISH STANDARD FOR STEEL AIR RECEIVERS.—An item has been added to the range of British Standards for Steel Air Receivers in the form of the newly-published standard for valves, gauges, and other safety fittings. This specification provides for fittings for air receivers and for compressed-air installations for maximum permissible working pressures not exceeding 1,000 lb. per sq. in., but does not deal with valves for portable gas cylinders. Copies may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d. post free.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

St. Pancras and Broad Street Service

105, Wellmeadow Road,
Catford, S.E.6. August 4

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In the appendix to the working timetable for March, 1898, the former North London Railway gave a passenger train head code for a service between St. Pancras and Broad Street. Can you or any reader give details of such a service and say exactly how St. Pancras would be reached from the North London line?

Yours faithfully,
T. S. LASCELLES

On the Footplate of L.M.S.R. Turbine Engine, No. 6202

Cheston Road Aston,
Birmingham 7. August 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR —The article by Mr. E. S. Waterhouse on the L.M.S.R. Turbine Engine No. 6202 published in your issue of July 23 was interesting as giving some comparison of the performance of this engine with that of an orthodox engine of similar size. The article, however, does not mention the fact that this engine and its tender are fitted on all axles with tapered roller bearings. You will recollect that this was the first instance of any locomotive outside the United States being equipped with roller bearings on all driving axles.

The running resistance of roller bearings is markedly different to that of the usual plain bearings and it would be interesting therefore to have had a comparison of the effect of the fitting of tapered roller bearings on the performance of this engine. In order to obtain any relative comparison it is essential for the roller bearing and plain bearing locomotives to be of similar type and it is to be hoped that it will be possible for such a comparison to be made as soon as conditions are once again favourable.

In the meantime, the turbine engine has now accumulated a considerable mileage and has demonstrated the reliability of the bearings with which it is fitted and their ability to withstand successfully the considerable shock loads to which they are subjected in railway service.

Yours faithfully,
For BRITISH TIMKEN LIMITED,
J. E. SPEAR,
Personal Assistant to the Chairman

Rail Corrugations

8, Comiston Rise,
Edinburgh, 10. August 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Rail corrugation has been so long-standing a source of trouble and speculation that the thought-provoking article by Mr. Burgess and your editorial comments thereon of August 6 are not unlikely to arouse fresh interest in the subject.

Some of Mr. Burgess's remarks and conclusions seem to lack circumstantial support. An attempt to focus the arguments anew may be worth while, even if it does not lead to a final result. The clue to the problem must be in the unique characteristic which is that in every case there is an unmistakable measure of regularity in the corrugations. This precludes the acceptance of any explanation which is not associated with some periodic or vibratory quality.

Among such unacceptable causes I would place Mr. Burgess's irregular distribution of chemical constituents, the cross-sectional profile of the rail and centrifugal action; incidentally, corrugation is by no means confined to curved track. For the same reason, his proposed cure of making the track more "springy" falls into the hair-of-the-dog-that-bit-you class, since springiness and vibration are synonymous. Pursuing the vibration clue, the effect might, supposedly, be a forced one originating in some regular variation of the rail surface and due, for instance, to a lack of truth in the finishing roll of the rail-mill. But the persistence and growth of the corrugation would still be obscure since there is no reason, offhand, to assume that a wheel would not be as likely to roll out the roughnesses as to roll them in.

I do not know if it has been established whether the metal from the hollows has disappeared or been transferred to the crests, but I believe the result of tests aimed at discovering physical differences between the metal at the two places has been negative. On the other hand, that the load has a natural vibratory quality involving, it may be, 200 or 300 alternations in a second, seems too far-fetched unless there is some primary cause provoking it. I would propose starting with the known fact that, under the pressure of the wheel, the metal of the rail tends to flow, often evidenced, in a lateral direction at least, by the mushrooming of the rail head. From this point the following suggestions, however reasonable, must be treated as speculative:—

(1) The lateral flow is accompanied by a longitudinal flow but having, unlike the former, no definite boundary, the body of flowing metal will accumulate.

(2) As the body of flowing metal increases, the total molecular resistance to further flow rises till flow stops and the process is repeated.

(3) A load on a two-point spring support is free to rock, if suitably encouraged, the motion resulting in an alternating rise and fall of the pressure on the rail.

(4) The rock tendency will be imparted if corrugations form at such intervals that the front support is on the rising, when the rear is on the downward, side of a corrugation, and *vice versa*.

(5) A condition is thereby set up in which there is first a growing tendency to form a corrugation accompanied by a diminishing resistance to its formation, followed immediately by the exact reverse in a continuous cycle. That corrugations actually result merely presupposes a suitable physical condition of the rail steel; when this is absent, so are the corrugations. A majority of axle spacings corresponding to the formative pitch of the corrugations must also be assumed.

If there is any truth in these hypotheses possible, irrespective of whether they are practicable, cures would be to reduce the load-pressure intensity, increase the ductile resistance and adopt a minimum of three axles per truck, frame or bogie.

Yours faithfully,
REGINALD PETER

Foaming in Locomotive Boilers

16, The Green, Castle Bromwich,
Birmingham. July 31

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Your editorial on the above subject on page 5 of *The Railway Gazette* dated July 2 last, again brings to the fore a problem which is inseparable from the use of softened water in locomotive boilers, that is, that of limiting the concentration of soluble salts in the feed water after softening. There is probably not a railway in the world using treated water which has not experienced the trouble due to boilers priming—that sudden ebullition which is quite capable of stopping a train, and may result in a mixture of up to 60 per cent. water in the mixture of steam and water being delivered to the cylinders. The term "foaming" is probably more applicable to the light carry-over of water from boiler to cylinders, consisting of up to 3-5 per cent. water in the mixture of steam and water, which is not so serious, especially as the majority of it will be evaporated in a superheated engine before reaching the cylinders.

To my mind, it is remarkable that the American railways should have found it necessary to instal such elaborate apparatus to control priming, such as is described in the article to which reference is made above. There is a large number of locomotives in this country using softened water, the majority of which are fitted with a simple automatic blow-down valve, which draws off a small, pre-determined, quantity of water at the boiler-water level during the time the regulator is open or the injector is at work, and thus limits the concentration of soluble salts between successive boiler wash-outs. This system has worked successfully, provided the blow-down valve is maintained in good condition; the thermal loss is minimised by passing the discharge through a cooling coil in the tender tank, thus preheating the feedwater to some extent.

That this system does not provide the panacea for the evils of priming on all railways, however, is evident from some remarks made in a paper on the subject recently presented to the South African Institution of Engineers by Mr. R. H. Black, wherein it is stated that an automatic blow-down valve, operating when the regulator is open, and situated on the back end of the firebox in such a position as to remove as much mud as possible, had proved more effective than removing water from the boiler-water level.

Thus there seems to be considerable divergence of opinion as to the means to be adopted in combating the troubles consequent on the use of softened water in locomotive boilers, and it would appear that there is an excellent case for this important matter to be brought under early discussion when international railway conferences are resumed after the cessation of hostilities.

Yours faithfully,
W. G. F. THORLEY

The Scrap Heap

Doing easily what others find difficult is talent; doing what is impossible for talent is genius.—*Henri-Frédéric Amiel.*

* * *

Riflewomen of the Women's Home Defence (Shirley) unit recently beat a Southern Railway Home Guard team by 667 points to 622.—*From the "Daily Sketch."*

* * *

HISTORY NOT REPEATED

Hours of waiting at the principal railway stations during the week-end enforced the appeal of the railway companies to the public to travel in mid-week.—*From "The Glasgow Herald" of 25 years ago.*

* * *

During the month of June last, L.N.E.R. staff contributed £3,114 in pennies to the Red Cross Penny-a-Week Fund, an increase of some 50 per cent. over recent months.

* * *

Among industrial workers, employees of the four main-line railways continue to lead the way in support of the Red Cross & St. John organisation. Figures issued by the Red Cross Penny-a-Week Fund show that up to the end of July railway staffs had contributed no less than £219,206 to the fund. Totals for the four groups were as follow: L.M.S.R., £90,837; L.N.E.R., £75,737; G.W.R., £28,712; and Southern Railway, £23,920.

* * *

"FOUGASSE" IN THE FACTORIES

The artist *Fougasse*, whose charming sketches have proved quite an outstanding feature of wartime publicity, has prepared a series of drawings for display in the factories of Short Brothers (Rochester & Bedford) Limited. The *motif* is:

ONE AIRCRAFT NOW
IS WORTH TWO NEXT YEAR

The drawings are amusing and topical, and direct to the point, but it would be unfair to the artist to reproduce an example on a small scale, as this would lose the effect of the colouring and also the whimsical touch. One of the drawings contains the following "poem":—

Even if your job is merely to fix the
little whatsitsname
that holds the thingummy
that turns the whatnot
that governs the so-and-so
that moves the so-on
that controls the so-forth
that works the aircraft,
don't forget that the aircraft
depends on the so-forth
that *depends* on the so-on
that *depends* on the so-and-so
that *depends* on the whatnot
that *depends* on the thingummy
that *depends* on *that little whatsitsname*!

* * *

At Leicester we stopped for a new engine. It was not yet blackout time and the windows were uncurtained. A shunting engine was stationary on rails opposite the Prime Minister's saloon. The driver of this engine was an old man with grey hair who wore a cap flattened by age, and grease and oil, and he was leaning from his cab to exchange some pleasantry with a friend on the line. Happening to lift his head, he became aware that he was separated by not more than six yards from an apparition that bore every resemblance to Winston Churchill. Although the brains of engine drivers move with considerable rapidity, it took him a second or two to become convinced that the vision was a reality during which time his mouth opened and a startled smile, which changed to one of great pleasure, crossed his blackened face. Lifting the oily cap from his head, he leaned out and shouted, "Good old Winston!" And the Prime Minister, lifting his cigar an inch or so from his mouth, gave one of his most roguish smiles. Then the train moved on. —*From "Atlantic Meeting," by H. V. Morton.*

* * *

38 Leicester Advertisements.

UNDER THE IMMEDIATE PATRONAGE
OF THE
DIRECTORS
OF THE
MIDLAND COUNTIES
RAILWAY COMPANY.

UNITED
RAILWAY & COACH OFFICE,
STAG AND PHEASANT
HOTEL.

It is with feelings of unfeigned gratitude and sincerity that

C. S. PETTIFOR

returns thanks to his numerous personal Friends, and to the Town and County of Leicester generally, for the liberal support and decided preference he has experienced as a Coach Proprietor for upwards of Twenty-five Years.

He takes the present opportunity of informing them, that in consequence of the adoption of Railway conveyance, he has been compelled to abandon those roads in which Coaches have been superseded by the new and rapid mode of travelling by Steam.

It is also, he trusts, with feelings of honest pride, that he announces himself as the *Agent to the Midland Counties Railway Company* for the collecting and delivering of Goods and Parcels at the Leicester and Syston Stations, SPECIALLY APPOINTED BY THE DIRECTORS; and under their auspices he is authorized to provide Flys, Cabs, Omnibuses, &c., for the immediate conveyance of Passengers and their Luggage to their several points of destination.

In again soliciting the favors and confidence of the Paplic in this new avocation, C. S. P. refers with satisfaction to his past life, as affording the best assurance that he will steadfastly maintain the same indefatigable diligence and punctuality—the same spirit of attentive accommodation—and the same integrity on the part of his servants—by which his establishment has been invariably distinguished.

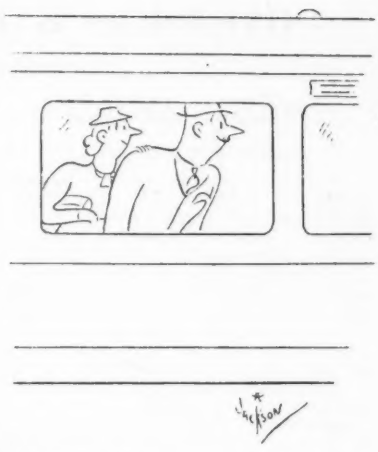
The Trains will be attended with promptitude and celerity, and every kind of information relative to Railway and Coach Travelling may at all times be obtained at the Office in Humberstone-Gate.

To secure the utmost facility of communication on the Cross Lines of Road, it is in contemplation, as far as possible, to make the time of the Coaches on such roads correspond with the arrival and departure of the Rail way Trains.

N. B. No fees to Fly, Cab, or Omnibus Drivers.

Leicester, April, 29th, 1840.

We are indebted to Mr. H. W. Bardsley, Honorary Librarian of the Railway Club, for the advertisement reproduced above from Tebbutt's "Guide to the Midland Counties Railway," 1840. It would appear to indicate a substantial measure of rail and road co-operation in the Leicester area upwards of 100 years ago



"We're in luck—a corridor to ourselves"

[Reproduced by permission of the proprietors of "Punch"

FREE TICKETS

I referred recently to special travelling facilities for M.Ps. during Bank Holiday week-end. Their travel, of course, between their constituencies and the House of Commons is free whether it is by rail, sea, or air, and it costs the country £37,000 a year. Members whose constituencies are far away from London usually make only infrequent use of the free vouchers. Members nearer London do many more journeys. There are a few who find themselves specially favoured. They are members whose constituencies are near London and who have their homes there. They travel free to and from the House of Commons every day they are engaged on Parliamentary business. In exchange for a voucher torn from a book a ticket is issued.—*From "The Londoner's Diary" in "The Evening Standard."*

* * *

A little poster with a fine portrait of the Queen is now being displayed in London Transport garages, depots, and workshops. Her Majesty is seen broadcasting to the women of the Empire on April 11 last, and the poster includes the following extract from her speech: "How often, when I have talked with women engaged on every kind of job, sometimes a physically hard or dangerous one—how often, when I admired their pluck, have I heard them say, 'Oh, well, it's not much. I'm just doing my best to help us win the war.'"

* * *

TAILPIECE

(The engine whistle has become a welcome reminder of home to British soldiers serving in the Middle East.)

It shrilled in airy spaces
Below an English hill,
In green and happy places
His heart remembers still.

And now that sudden pealing
Long known he hears again
Across the desert stealing,
The Libyan hill and plain.

He hears it as he paces
The burning stone and sand,
And in the desert spaces
He sees his native land

E.C.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Responsibility Allowance

After negotiations between the administration and the consultative committee of the railway staff associations, it has been decided to grant, with effect from April 1, 1943, a temporary non-pensionable extra responsibility allowance to all staff governed by a basic salary or wage not exceeding £735 a year. The rate of the allowance will be 5 per cent. Emoluments for the purposes of the agreement will include salaries and wages; the value of free quarters or allowances in lieu thereof; the value of rations; weekday overtime and Sunday time; bonus earnings; disability allowances of artisans and allied grades, and similar payments in respect of work actually performed. It has been recognised by the administration that any undue increase in basic salaries and wages at this time might have unfortunate inflationary tendencies and in the negotiations this aspect of the question was kept prominently in view, but it is accepted that, because of war conditions and the heavy increase in responsibility on all sections of the staff, some recognition should be made in the way of a non-pensionable allowance on emoluments. Railwaymen on active service also will receive the allowance.

Hercules-Koedoespoort Railway

The new line from Hercules, on the Pretoria-Pietersburg line, to Koedoespoort, on the Pretoria-Rayton section, mention of which was made in *The Railway Gazette* of March 13, 1942, was opened on June 7 by the Minister of Railways & Harbours—Mr. F. C. Sturrock. The new locomotive sheds and marshalling yards at Capital Park (Pretoria) also were opened. The new works have been carried out at a cost of £750,000, of which the Pretoria Municipality has contributed £80,000. To meet the needs of the Pretoria system further new works are to be undertaken. Among these are the extension and modernisation of the locomotive workshops and passenger yards at Pretoria and the erection of new system offices. Railway buildings are to be erected near to the City Hall and a new station at Rissik is under consideration. The line from Pretoria to Capital Park is to be electrified.

Johannesburg Station Extension

The technical sub-committee set up to investigate the proposal to take over the well-known Wanderers sports ground for the purpose of extending Johannesburg Station facilities, a reference to which was made in the January 8, 1943, issue of *The Railway Gazette*, has recommended the taking over of the ground. Seven proposals considered by the committee were, a new main-line passenger station at Braamfontein; an underground suburban station under the present Johannesburg Station, the line to extend from Doornfontein to Braamfontein; the complete remodelling of Johannesburg and Braamfontein Stations; the laying out of a separate main-line station at Milner Park; the lowering of the whole of the existing station by 30 ft. and building extra platforms under the Wanderers ground; the building of a "dock" station into Braamfontein; a relief main-line station at Doornfontein. All these were negatived for financial, engineering, or other reasons. The Minister has since agreed to the appointment of an independent expert from overseas to advise on the problem.

Reduction of Coal Rates

As a further step to help keep down the price of common household commodities, the Minister has decided to reduce the tariff on coal for local consumption under certain conditions. From June 21, coal for these purposes is carried at 1s. 3d. a ton less for distances greater than 20 miles. Similar reductions are allowed for distances between 5 and 20 miles. This action has been taken as the relief so afforded should be of direct benefit to domestic and other private consumers, as well as to power stations, public authorities, and industry in general. Since the outbreak of war, temporary reductions, varying from 25 to 50 per cent. have been authorised in railway rates on about 40 essential foodstuffs used in average households.

UNITED STATES

Southern Pacific Motive Power

One of the main users of articulated locomotives in the United States is the Southern Pacific. With engines of this type delivered in 1942, and orders in course of execution, the railway will have added no fewer than 70 powerful locomotives of the 4-8-8-2 type to its stock in two years—49 in 1942 and 21 in 1943. A number of these engines burn oil, and have the cab at the front end, with the chimney at the rear, and the tender behind. In addition, 20 more of the fine semi-streamlined locomotives of the "Daylight" 4-8-4 type will have been acquired; 10 were delivered in 1942, and 10 are in course of construction. Of diesel-electric types, 23 shunting locomotives were purchased in 1942; and, out of 30 contemplated in 1943, 20 have been authorised to date by the War Production Board.

Special Service Charges

On only seven trains in the United States are special-service charges being continued in addition to ordinary fares and Pullman supplements. These trains are the Twentieth Century Limited between New York and Chicago, New York Central System; the Merchants Limited between New York and Boston, New York, New Haven & Hartford Railroad; the Super-Chief, Chief, and El Capitan between Chicago and Los Angeles, Atchison, Topeka & Santa Fe Railway System; the City of Los Angeles between Chicago and Los Angeles, Chicago & North Western Railway and Union Pacific Railroad; and the City of San Francisco between Chicago and San Francisco, Chicago & North Western Railway, Union Pacific Railroad, and Southern Pacific. The first four mentioned are all-Pullman trains; El Capitan is an all-coach train; and the two City trains carry both Pullman and coach passengers. All the services but the steam-hauled Twentieth Century and the Merchants Limited are diesel-electric streamliners; and the Merchants Limited is in part electrically hauled, and for the rest of the journey, north of New Haven, steam or diesel haulage is provided. As previously mentioned in these columns, the special service charge on the all-Pullman Broadway Limited of the Pennsylvania Railroad between New York and Chicago has been abandoned, and this is the first time in history that the Broadway and the Twentieth Century have failed exactly to duplicate their times, facilities, and working methods.

New York Traffic

During 1942, as a result of wartime restrictions on road transport, passenger traffic by railways and ferries serving New York City increased by 13·5 per cent. over 1941, whereas road traffic by ferries, bridges, and tunnels dropped sharply. The actual railway and ferry total of 291,154,442 passengers into and out of New York in 1942 was an increase of 34,677,504 over 1941; season-ticket journeys increased by 3·8 per cent. On the long-distance railways serving New York, passenger traffic was up by 19·6 per cent.

Relative Traffic Density

The record for density of traffic among United States railways of over 400 miles in length is held by the Norfolk & Western Railway, one of the principal coal-carrying lines. During 1942 the net ton-miles of traffic handled by this railway averaged 24,940 daily to every mile of line. The nearest competitor was the neighbouring Chesapeake & Ohio Railway, with 24,159 ton-miles; after this came the Pennsylvania Railroad, with 19,513; the Delaware & Hudson Railroad, with 18,336; the New York, Chicago & St. Louis Railroad (Nickel Plate), with 17,770; and the Reading Company, with 17,292 ton-miles. The extent to which coal dominates Norfolk & Western traffic is shown by the fact that, during 1942, 53,878,415 tons of coal were loaded by this company, as compared with 16,764,234 tons of all other commodities.

ARGENTINA

Railway Representatives Visit President

On June 21, a deputation of legal representatives and General Managers of the foreign-owned Argentine railways paid a courtesy visit to the President of the Republic, General Pedro P. Ramirez. The deputation consisted of Dr. Luis O'Farrell (B.A. & Pacific Railway), Messrs. Guillermo O. White and O. Loewenthal (B.A. Great Southern & B.A. Western Railways), Señor A. Iturbe (Central Argentine Railway), Señores E. Chanourdie and Emilio F. Cardenas (Santa Fé Provincial Railway), Dr. H. Bustos Moron (Rosario-Puerto Belgrano Railway), Dr. Osvaldo Rocha (Cordoba Central State Railway), and Mr. F. A. Bottomley (Entre Rios & N.E. Argentine Railways).

After assuring the President of their collaboration, Dr. O'Farrell, who acted as spokesman, stated that the visitors did not propose to worry His Excellency with their problems, as these were already under study by the Minister of Public Works, who had promised a quick solution to their difficulties. Dr. O'Farrell explained that the object of their visit was to stress the old and close collaboration which had always existed between the Argentine Government and the railways, and which was based on a mutual understanding.

In thanking the visitors for the offer of their collaboration, the President added that the Minister of Public Works was studying their problems, to which he felt sure that a satisfactory solution in the best interests of the country would speedily be forthcoming.

Public Works Restrictions

In pursuance of its declared policy of drastic economy which the new Argentine Government has adopted, with a view to reducing expenditure in all departments to

a minimum, the Ministry of Public Works has issued a Decree ordering the following economic measures to be put into force :—

(*a*) No new works to be commenced, even although they have been already authorised; (*b*) all works already started but still in the preliminary stage, to be discontinued; (*c*) such works as are well under way may be continued, but must be confined to absolute essentials.

The foregoing restrictions do not apply to maintenance and conservation works. Calls for public tenders will be left in abeyance for the time being, and as to such contracts as are actually being carried out, each case will be dealt with on its merits in co-operation with the contractors concerned.

Recovery of Waste Coal

The scarcity and high cost of nearly all classes of fuel, more particularly coal and petroleum, is compelling the Argentine railways to adopt all kinds of expedients and emergency measures aiming at making good the shortage, and supplementing their dwindling fuel supplies from all available sources. For some time the Central Argentine Railway has been engaged in recovering from the bed of the Paraná river coal dropped over a prolonged period during the unloading of steamers at the port of Villa Constitución. Normally, such salvage work would not be worth the cost, but in present circumstances every scrap of coal which can be retrieved and utilised is of importance.

Diving operations were commenced in June, 1941, and the company's initiative and resourcefulness have been rewarded by the recovery during the last two years of 634 tons of coal, or an average of approximately half a ton each working day. Although not adapted for locomotive firing, due to its prolonged immersion, the coal has been found to be quite suitable for consumption in the company's electric-power station at San Fernando, which supplies current to the Buenos Aires electrified suburban section.

The Salta-Socompa Railway

Further to the information given in *The Railway Gazette* of May 15, 1942, and January 22, 1943, relating to the Salta-Socompa Railway, the following supplementary data as to the present stage of the work and the character of the terrain, supplied by the contractor for the scheme, Mulville & Company, Buenos Aires, are of interest :—

The construction of part of the Argentine section from Salta to San Antonio de los Cobres was completed in 1928 and has been in operation since that year. The distance between these two points is approximately 175 km. (109 miles). The latter point is the capital of the territory of Los Andes. Construction work was resumed in 1938, and railhead has now reached a point 332 km. (206 miles) from Salta; goods traffic is run to this point. From this point to the Chilean frontier the construction of the line is being carried out by Mulville & Company. The distance from Salta to Paso de Socompa on the Chilean frontier is 572 km. (355 miles), and from there to Antofagasta 340 km. (211 miles), making a total of 912 km. (565 miles). Mulville & Company has undertaken to complete the earthworks, including three tunnels, by 1945. At present it has completed the line to Tolar Grande, including two tunnels with a total length of 350 metres.

The line traverses the Andean plateau, crossing the territory of Los Andes at an altitude varying between 3,800 metres and 4,500 metres above sea level. It crosses several salt marshes, including one known as "Salar de Arizaro," some 50 km. (31 miles) wide. Because of the mountainous territory and the excessive altitude, the work is expensive, and it is difficult to obtain the necessary labour. On the Chilean side the line has been constructed to within 70 km. (43 miles) of the frontier. It is expected that the two sections will be united in 1946. The completion of this railway will provide an outlet for direct trade between the Pacific Ocean and the Northern Argentine region.

SUMMARY

	Km.	Miles
Salta to San Antonio de los Cobres (in service)	175	109
San Antonio de los Cobres to Tolar Grande (line completed)	210	130
Tolar Grande to Paso Socompa (frontier) under construction	187	116
Total	572	355

Professional Meetings

At the meeting of the Argentine & River Plate Centre of the Institute of Transport held in Buenos Aires on July 6, Mr. W. Howell, A.M.Inst.T., Assistant Traffic Manager, Buenos Ayres & Pacific Railway, read a paper on "The Grain Trade in the Argentine Republic." The Chairman of the Centre, Mr. G. C. Bonner, presided, and the gathering included Mr. W. B. McCulloch, Assistant Commercial Attaché, Canadian Legation, and Señor Raul M. Uritolo, representing the National Grain & Elevators Commission. The reading of the paper was followed by a discussion.

SWITZERLAND

1942 Results

The record profit of fr. 18·5 million reported by the Federal Railways for 1941 was not approached in 1942, by reason of increased expenditure for materials and staff. Nevertheless, there was a profit of fr. 2·5 million, which will again be used towards covering former insufficient depreciation on construction capital. The following table shows the principal data :—

	1941 Mill. fr.	1942 Mill. fr.
Receipts—		
Passengers	161·6	176·8
Goods, livestock, and luggage	268·3	264·6
Mails	10·2	10·9
Sundry receipts	14·9	16·0
Totals	455·0	468·3
Expenditure—		
Administration	5·9	6·1
Construction and maintenance	46·4	56·0
Traffic operation	93·3	99·9
Traction and workshops	90·3	99·4
Sundries	28·4	27·0
Totals	264·3	288·4

A record passenger figure of 159 million was reached, which was 15 million over that for 1941; passenger receipts increased by 9·4 per cent. Goods traffic declined for the first time since 1938.

BELGIUM

National Railways in 1942

From the official report of the Belgian National Railways for 1942 it appears that two main factors were chiefly responsible for the decline in goods traffic, mention of which was made in the May 21 issue of *The Railway Gazette*; these were the intense frost experienced early in the year, and the considerable shortage of locomotives and rolling stock.

Goods conveyed in 1942 totalled 38,370,000 metric tons, compared with 43,609,000 metric tons in 1941. Home traffic accounted for 28,070,000 metric tons (31,649,000 metric tons) and international traffic amounted to 9,467,000 metric tons (11,960,000 metric tons). Goods conveyed in transit totalled 833,000 metric tons; no figure is available in the latter respect for 1941, as transit returns were not made before 1942. The table below gives comparative figures of goods traffic for 1942 and 1941 :—

	Metric tons	
	1942	1941
Home traffic—		
Agricultural products	3,110,000	2,944,000
Fuel	14,986,000	16,064,000
Ore	261,000	330,000
Metallurgical products	1,471,000	1,862,000
Building materials	2,560,000	3,214,000
Stone, etc.	2,880,000	3,623,000
Textiles, tanned articles	99,600	111,800
Chemical products	1,026,000	1,087,000
Fats, industrial oils	274,000	291,000
Various	1,687,000	2,072,000
International traffic—		
Agricultural products	450,700	434,700
Fuel	3,338,000	4,505,000
Ore	2,974,000	3,586,000
Metallurgical products	454,300	500,900
Building materials	427,000	435,900
Stone, etc.	493,000	730,500
Textiles, tanned articles	123,500	258,800
Chemical products	193,900	207,500
Fats, industrial oils	97,500	61,600
Various	286,300	259,700

In international traffic fats, and industrial oils, as well as goods in minor categories, showed increases. The increase in agricultural traffic was due mainly to the expansion of the potato areas, the substantial wheat consignments in transit through Belgium, and the abundant fruit harvest. On the other hand, the conveyance of fodder and oilcake declined. The drop in the weight of fuel conveyed was due to a decline in the amount of hard coal and briquettes. The conveyance of coke remained, on the whole, on the 1941 level. The decrease in ore traffic was due mainly to reduced imports.

Small consignments averaged a much lower level in 1942 than in 1941. In April, 1942, considerable restrictions were introduced in respect of this class of traffic, which thereby was forced on to express-traffic trains until merchandise of the latter type was put under similar restrictions at the end of September. Parcels traffic showed its lowest record in December.

CEYLON

Pilgrim Trains

The provision of special facilities for the transport of pilgrims to Sri Pada, the mountain peak sacred to Buddhists, is to be discontinued to conserve transport. The railways were unable to cope with the crowds of pilgrims at Colombo early this year, and were obliged to stop bookings for one day. Pilgrims continued to flock into the station and waited for hours until a train came. The number of pilgrims to be carried averages about 500 a day throughout the season. On the day on which booking was suspended the number increased threefold.

Railway Economy

On the recommendation of the Minister of Communications & Works, his Executive Committee has approved an increase in passenger fares, and parcels and goods rates, simultaneously with a programme for the further curtailment of services.

The proposed increase in passenger fares is intended to serve as a means of discouraging travel and of counterbalancing to some extent, the loss in passenger earnings which would result from the reduction in services. The proposals amount to an increase of one-seventh in the basic fares, and the abolition of the concession for long journeys. An increase of one-seventh in the normal season-ticket rates also is recommended.

Service Tests to Determine Locomotive Efficiency

Suggested substitute for indicator diagrams

A RECENT issue of the Quarterly Technical Bulletin of the Indian Railway Conference Association contained a valuable and provocative article by Mr. C. W. Clarke, bearing the title given above.* The view is still widely held that indicator cards themselves furnish a sufficient amount of information as to a locomotive's performance to enable them to be used for acceptance tests, without insistence on any other trial. Mr. Clarke, who holds the position of Mechanical Engineer to the Great Indian Peninsula Railway, begins by pointing out that indicator cards can be conveniently used to measure *horse-power* only, and cannot be employed to determine *efficiency*, which he regards as much the more important quantity of the two. Excellent indicator cards can be obtained from locomotives having leaky valves, and no suspicion of an excessive rate of steam consumption per indicated horse-power-hour can be derived from a study of the cards alone. Although it is possible to determine—"by laborious analysis," as Mr. Clarke admits—the rate of steam consumption from indicator cards, it would be unfair to expect, say, a locomotive inspector to calculate the "missing quantity" or to determine the equations of polytropic curves. Moreover, even in the hands of trained staff, a surprisingly large degree of error can arise when estimating the indicated horse-power of locomotives, due to inertia and "whip" of the moving parts of the indicator gear and stretch of the cord. On the German State Railways, Nordmann† has shown that errors of 7 per cent. occurred in indicator cards taken from standard goods locomotives; and Giesel-Gieslingen‡ has stated that at speeds of 250-300 r.p.m. the indicator diagram can be 6-10 per cent. longer than on cards taken at low speeds, resulting in an indicated horse-power 3-5 per cent. too low. Indicator cards, then, can only confirm that the valve events occur in correct order; they give no information as to whether the valves are steamtight, nor do they show whether the locomotive is working efficiently. As for providing a confirmation of valve events—what more is wanted when mechanical measurements of the valve movements offer a much quicker and easier check? Finally, suppose a faulty indicator card *were* produced: could one in a hundred locomotive men say just what was wrong?

Service tests should cover some method of estimating efficiency, and Mr. Clarke recommends the following tests to be applied at regular intervals while the locomotive is in service:—

Test A. Valve events.—Check these by mechanical measurements as the quickest and most accurate method.

Test B. Steamtightness of valves.—Check the exhaust steam temperature by thermocouples inserted through the steam chest covers and connected to a direct-reading galvanometer fitted, with suitable selector points.

Test C. Steam consumption rate.—This measures efficiency directly, and is recommended as the master service test. The heat content per lb. of steam at inlet and exhaust is measured, to determine the heat drop and steam rate per unit of power.

Test D. Indicated horse-power.—The blast pipe is used as a flow meter, and from the steam consumption rate as determined by test *C*, the indicated horse-power is obtained.

Mr. Clarke suggests that, for service tests intended to maintain locomotive efficiency, tests *A* and *C* might be adopted, and conducted after every valve examination (say after every 6 months). The results thus obtained have been shown to agree within 2 per cent. of those given by indicator diagrams; the apparatus needed is much cheaper and simpler; and every engine at a given running shed could, if needed, be subjected to test *C*, whereas it would be almost impossible to carry out the equivalent indicating tests.

Test B.—In an engine just from the shops, the valves are generally steamtight, and the exhaust steam temperature is usually only slightly above that corresponding to atmospheric pressure. As wear occurs, live steam leaks past the valve and raises the exhaust temperature. Thermocouples inserted in the exhaust passages at the ends of each cylinder and connected to a direct-reading galvanometer (with the necessary selector points) enable exhaust temperatures to be determined. Uniform test conditions (for example: regulator full open; cut-off 25 per cent.; speed near to 45 m.p.h. as possible) should be specified. The cylinder walls and exhaust pipe passages must be allowed to attain uniform temperature conditions, and it is suggested that for any particular class of locomotive just out from the shops a test could be made and the temperature recorded as a "datum line" for that particular class. A limit can then be fixed (say 75° F. above that temperature), to exceed which will render examination of the valves necessary, with renewals if required. In carrying out test *B*, the accuracy of the index plate of the reversing lever must never be taken for granted. The "mid gear" may be as much as $\frac{3}{8}$ in. out of agreement with the true position given by the die block being in mid-position in the link.

Test C.—Heat and work being mutually convertible (by the first law of thermodynamics), once steady flow conditions are attained, the heat drop in unit time is equal to the mechanical energy delivered plus the radiation loss. Thermocouples inserted in the branch steam-pipe elbows and in the blast pipe give the respective temperatures of the steam entering the cylinders and at exhaust. Pressures at the same points are recorded by a gauge on the steam-pipe elbow and a manometer connected to the blast pipe. The total heat content of the steam at inlet and exhaust is then determined from steam tables. Neglecting radiation losses, the heat drop is equal to the work done in a given time. One horse-power-hour is equivalent to 2,545 B.Th.U. per hr., so the steam consumption rate can then be obtained by dividing 2,545 by the heat drop per pound of steam. This method testing, suggested by Mr. Lawford H. Fry,§ has also been used by Mr. A. Williams‖ for comparative superheater trials. Tests on Pennsylvania RR. 4-6-2 locomotives showed that radiation losses from steam pipes, steam chests, cylinders, and exhaust passages were about 0·42 per cent. of the heat drop at starting, and 0·83 per cent. when running at 100 m.p.h. This method of testing can be used only when the exhaust steam in the blast pipe is at least dry. Tests carried out in India have shown that on the "B.E.S.A." broad-gauge locomotives, steam is always slightly superheated at exhaust, so the method is applicable.

Test D.—When working under fairly constant conditions the blast pipe of a locomotive may be used as a flow meter. For this test it is necessary to determine the pressure and temperature of the steam at a specific point in the blast pipe, also the pressure in the smokebox. The temperature is measured by a pyrometer and the blast pipe and smokebox pressures by manometers. The cross-sectional areas of the blast pipe at the orifice and at the point where the pyrometer is inserted are obtained by direct measurement. Based on first principles of continuity of steam flow, Mr. Clarke then gives a formula for calculating the steam consumption in lb. per hour, using results obtained from actual observations and data from steam tables and a Mollier chart. The expansion of the steam is considered to be isentropic, there being no time for any heat flow during the passage through the blast pipe. Mr. Clarke suggests that readings might be taken at 1-min. intervals for a 10-min. test of this type under uniform conditions. The steam consumption obtained in this test, divided by the "steam rate" obtained in test *C*, gives the indicated horse-power of the locomotive.

Mr. Clarke provides a number of worked examples which reveal very clearly the simplicity of his methods. In conclusion, he claims that a small expenditure on providing two or three sets of testing equipment for each running division of a railway would soon be repaid by the economies achieved by applying the lessons learnt from the actual tests. If, he states, by establishing regular and accurate service tests, the average rate of steam consumption of locomotives could be reduced from, say, 20 to 17 lb. per i.h.p.-hr., coal consumption would correspondingly be reduced from, say, 3 to $2\frac{3}{4}$ lb. per i.h.p.-hr.—a saving of $8\frac{3}{4}$ per cent. in the fuel bill, which itself represents about 10 per cent. of the railway's total expenditure, or nearly 25 per cent. of the operating costs. Mr. Clarke's plea for this simple but exceedingly valuable scheme of testing might well be considered here from the viewpoint of the potential saving it could yield in the railways' coal consumption, a saving which was never more desirable, from the national viewpoint, than at the present time. The possibility of organising staff, under present conditions, to conduct the tests is, however, another matter.

TRANSANDINE RAILWAY RECONSTRUCTION.—A Reuters report from Santiago de Chile dated August 13 says that a quantity of explosives has been obtained from the U.S.A. to facilitate the work of reconstruction of the section of the Transandine Railway on the Argentine side of the Andes as a result of negotiations conducted by the Chilean Under-Secretary of Commerce. The explosives include 2,500 cases of gelignite. Reference to this work of reconstruction was made in our July 23 issue.

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* Reprinted in *Journal, Inst. Loco. Eng.*, 1943, vol. 33, p. 77

† Z.V.D.I., 1934, vol. 78, p. 729

‡ Trans. A.S.M.E., 1936, vol. 58, p. 254

§ Proc.I.Mech.E., 1927, p. 923

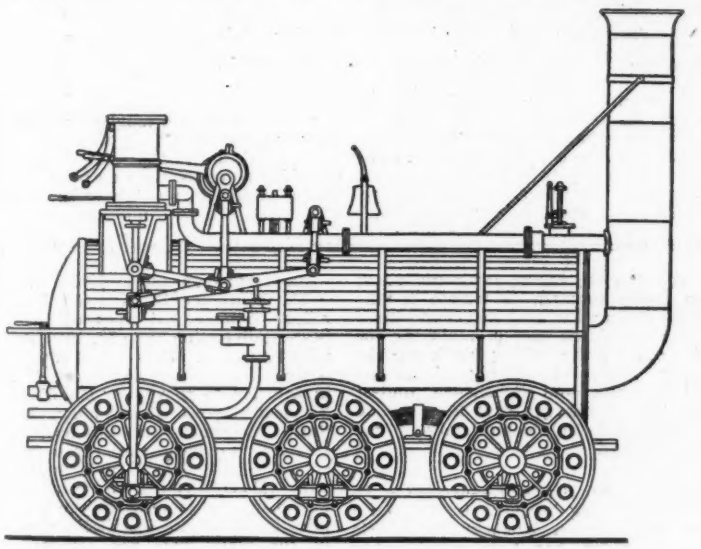
‖ Trans. A.S.M.E., 1935, vol. 57, R.R.-57-5

Electric Railway Traction—I

An historical survey of the early experiments in electric railway traction, given in a Faraday lecture

By C. E. Fairburn, M.A., Acting Chief Mechanical Engineer & Electrical Engineer, L.M.S.R.

THE word "railway" today means a comprehensive system of tracks, rolling stock, stations, and so on, but the word "railroad" originally implied only a track laid with rails. In the same way the word "tramway" is probably derived from the fact that the early tracks were made of baulks of timber known as "trams." Early railroads in this country were in use in the 17th century for moving coal on the Tyneside; from then until the beginning of the 19th century the number of railroads and tramways grew; the wagons were horse drawn.

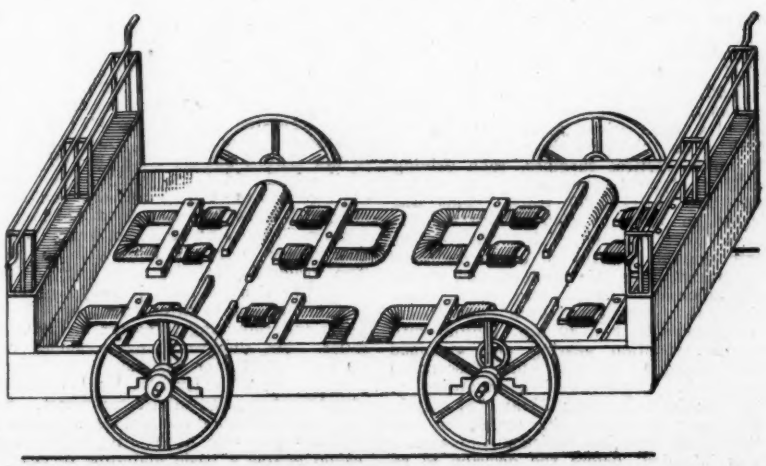


The "Royal George" of 1827 by Timothy Hackworth

Experiments with steam power for locomotion on roads were made in many countries and credit for the first successful road engine appears to be due to a Frenchman, Nicholas Joseph Cugnot. From the beginning of the 19th century there were numerous experiments in this country with steam engines for rail traction and the successful engine *Locomotion* was put into service in 1825; it weighed 7 tons and ran at about 5 m.p.h. with a maximum speed of 8 m.p.h. It was, however, expensive to operate, but a locomotive which ran economically enough to make steam traction cheaper than horse traction was the *Royal George*, a diagram of which is shown. It was built by Timothy Hackworth and began work in 1827.

Horse traction having been forced into the background, the next phase of development was competition between the steam locomotive and rope traction with steam winding gear, but the Rainhill trials of the *Rocket* in 1829 established the superiority of the locomotive. Whilst the steam locomotive was continuing its development, from 1829 to 1840 Faraday, Oersted, Ampere, Davy, and others were actively investigating a series of phenomena which we now know as magnetism and electricity, and were laying the foundations of our present electrical knowledge.

The primary cell, by which chemical energy can be released as electricity, had been discovered by Volta in 1799, and it is interesting to note that as early as about 1838, a time when it was still doubted whether the steam locomotive would come into general use, an experiment was made using electricity from such cells as the motive power for a rail vehicle. The experiment was carried out by Robert Davidson whose locomotive, shown here by a diagram, ran on the Edinburgh & Glasgow Railway in 1842. Though this experiment had a measure of technical success, it was quite impossible as a commercial proposition. The electro-magnetic motor of that time was very inefficient and this drawback, coupled with the great cost of primary cells, caused electric traction to fall into abeyance for some time.

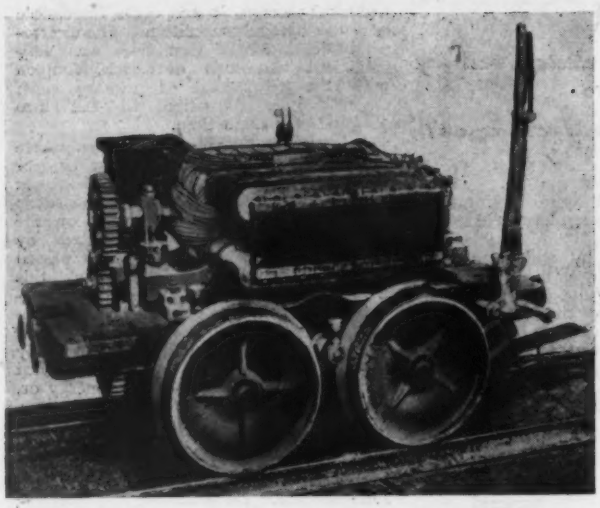


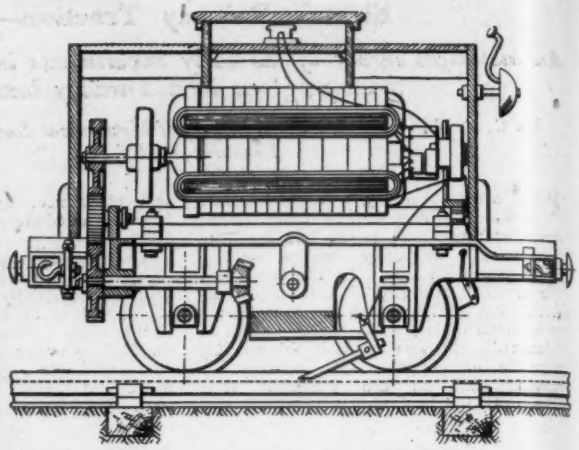
Davidson's battery-electric locomotive of 1842

It must be realised that the whole basis of electric traction today, or, for that matter, the whole electric-power industry, depends on the dynamo-electric machine, which in turn depends on the fundamental principle enunciated by Faraday that when a current is passed through a wire in a magnetic field this wire will move at right angles to the magnetic field, if free to do so. The dynamo-electric machine, in whatever particular form it is constructed, is functionally reversible, that is, it can convert mechanical energy into electric energy or, if supplied with electric energy, it can do mechanical work. The recognition of this fact made it no longer necessary to use primary batteries on the train for the source of energy as it then became possible to establish stationary generating stations where dynamos, driven by prime movers such as steam engines, provided a current supply to the trains through a track conductor system.

After Davidson's experiments a locomotive was constructed by the Breton Brothers in 1851 but with indifferent success. In 1864 Bonelli tried an electric locomotive without a motor which depended on the attraction of one energised coil for another. Several other investigators tried to solve the problem by designing an electro-magnetic locomotive, but the first really successful application of electric traction was due to the experiments of Siemens in 1879 and 1880; these led to a practical electric railway in 1881. Siemens's first electric railway was a miniature line 900 yd. long installed in the Berlin Trades Exhibition of 1879. It was operated from a low voltage direct-current supply taken from a third rail and carried 80,000 passengers during the exhibition. Line and photographic illustrations are given of the locomotive used.

The success of this line led to a short public railway of 1½ miles in length being laid down at Lichterfelde, in the neighbourhood of Berlin. This railway was opened on May 12, 1881, and was the first electrically-operated line in the world to be used for public service. Each of the cars had a 10 h.p. motor





Above: Sectional drawing of Siemens locomotive
Left: Siemens electric locomotive, 1879

taking a 180 volt direct-current supply from the running rails. The first electric line in England (apart from exhibitions) was Magnus Volk's railway along the front at Brighton; this and the Portrush & Bushmills line in Ulster were both opened in the late summer of 1883.

The earliest vehicles all took current from the running rails or from a third rail, but in the early 1880's Siemens experimented with overhead systems. An arrangement using twin overhead cables was installed on a short length of line but was not a success, nor were some other experiments in which the supply was taken from two longitudinally-slotted tubular conductors hung above the track. It was not until later that the problem of taking a supply from an overhead conductor system was satisfactorily solved.

(To be continued)

ELECTRIFICATION IN SPAIN.—The electrification of the Madrid (Norte)-Avila section of line has had to be slowed down repeatedly due to difficulties experienced in the supply of materials and equipment (mainly copper); and the introduction of electric traction has had to be postponed several times. It is learned, however, that on the section Madrid-Villalba-El Escorial the work of electrification is nearing completion. Work at Avila Station is stated to be well behind schedule in respect of both the necessary reconstruction work and of electrification work proper.

THE FIRST ELECTRIC RACK RAILWAY.—The *Bulletin Sécheron*, the house journal of the well-known Geneva firm of that name, gives some details of the equipment of the first electrically-operated rack railway, constructed between 1890 and 1893 on the slopes of Mont Salève in France, close to the south-eastern frontier of the Swiss canton of Geneva. The line, since replaced by a cableway, was of metre gauge, with Abt-type rack rail, and about 5½ miles long, with a maximum gradient of 1 in 4. The electrical equipment was provided by Cuénod, Sautter & Company, the predecessors of the Sécheron works, and comprised a water-driven generating plant at Arthaz, on the Arve river, composed of 2 Jonval vertical turbines, each driving a Thury type 12-pole generator, feeding the third rail at 800 volts. This was placed on porcelain insulators outside the track and it is believed that this was the first example in Europe of a conductor rail being put in this position, now generally adopted. The 12 motor coaches carried 40 passengers each and were equipped with two 40 h.p. motors with double reduction gearing and arranged for dynamic braking when descending the rack. Speed varied, according to the gradient, between 3½ and 6½ m.p.h. For over 40 years the apparatus continued to function satisfactorily and it was intended, before the decision to replace the line by a cableway was taken, to modernise the rolling stock and adapt it to faster running, a tribute to the original design; the Sécheron works have taken a prominent part in supplying the equipment for the rolling stock for the recently electrified Brünig line, and Furka-Oberalp, and Schöllenen routes; the latter was changed over from d.c. to a.c. working to obtain uniformity in the area concerned.

NEW DRUMM BATTERY.—According to reports appearing recently in the *Irish Times* the Drumm battery for electric train propulsion has been considerably improved since it was introduced on Irish railways ten or so years ago. The inventor, Dr. J. J. Drumm, working in conjunction with the Edison laboratories in the United States has succeeded in reducing the bulk and the weight for a given storage capacity. Mr. T. Illingworth, A.M.I.E.E., A.M.I.H.V.E., Electrical & Heating Engineer to the Office of Public Works, who recently lectured at Trinity College, Dublin, on the subject of Irish railway electrification, foresaw that the Drumm system, costing only about £5½ million, would meet the needs of Eire, with its relatively low traffic density, better than the orthodox system costing some £19½ million. The new battery combined the robustness of the Edison battery with the efficiency of the lead-acid type, but its great advantage was the rate at which it could be charged. Thus, batteries capable of taking a train 90 miles at 55 m.p.h. could be recharged for the return journey in 15 min. The original batteries are still giving normal service (32 daily journeys between Dublin and Bray) after operating for 10 years and providing transport for 300,000 miles. Mr. Illingworth recommended the Drumm system for secondary and feeder-line traffic, also for slow goods traffic, shunting duty, and suburban services. He said that this would account for 71 per cent. of the total train mileage in Ireland and would enable a basic main-line service to be operated in an emergency.

ELECTRIC WORKING IN ITALY IN 1941-42.—The route length of 5,430 km. (3,372 miles) of electrified lines of the Italian State Railways on June 30, 1942, compared with 5,218 km. (3,240 miles) a year previously. During the year ended that date, in addition to the power supplied by the 35 electric power-stations owned by the State Railways, privately-owned power stations provided the State electrified system with 1,543,000,000 kWh., compared with 1,308,000,000 kWh. in the preceding year. An increase in the power supplied by the State installations originated in the main from the Bressanone and Rio Valles power stations (about halfway between Bolzano and Brennero), and the increase in the case of the privately-owned power stations from those of Larderello and Castelnuovo, in the Tuscan Apennines. The latter use methane gas for prime motive power, obtained locally. The cost of production of the power supplied to the State Railways amounted to 7·73 centesimi a kWh. in the case of the State-owned power stations, and to 10·02 centesimi a kWh. in the case of the privately-owned installations.

NEW YORK STATE LEVEL CROSSINGS.—The annual report of the New York State Public Service Commission for 1942 shows that good progress was made with the work of eliminating level crossings in the state. During 1942 a total of 71 of the crossing eliminations was carried to completion, at a cost of $13,666,400; and work on four schemes, involving thirteen crossings, was well advanced and likely to be completed during 1943, at a cost of another $5,000,000. Since the Grade Crossing Elimination Act was passed in 1926, 912 crossings in New York State have been replaced by overline or underline bridges, and 578 crossings have been dealt with under the Railroad Law, making a total of 1,490. Some 135 additional projects are now under consideration, and these would involve an estimated expenditure of $35,000,000.

L.N.E.R. Bridge Renewal in East Midlands

A delicate piece of bridge engineering was performed by the L.N.E.R. recently at a point in the East Midlands where the L.N.E.R. passes over an L.M.S.R. station 19 ft. below. Although the time needed for the whole work was 5 weeks, traffic over the bridge was suspended completely for only one day, from 5.30 a.m. to 9 p.m., and a fleet of motor coaches made a connecting link between the temporary terminal stations.

The bridge is a multi-span viaduct consisting partly of brick arches and partly of steel bridges, and was built nearly 50 years ago. The damage to the original steelwork was due to engine blast caused by heavy L.M.S.R. traffic passing beneath, and the repairs were complicated by being centred in a 104 ft. span straddling the L.M.S.R. station below, and resting at one end on a brick abutment built on to a platform and at the other on steel stanchions built into platform buildings on the main part of the station.

The work consisted of the renewal of three underslung cross girders, each about 30 ft. in length, together with the adjacent rail bearers and steel decking. The cross girders are each 4 tons in weight and are suspended from the bottom boom of two steel parapet "N" type girders 12 ft. deep which carry the decking.

The removal of the old steelwork was effected by first burning off the rail bearers, then lowering the cross girders, rail bearers, and decking plates into wagons run into position on the line below. The trucks containing the new steelwork were then placed under the bridge and the steelwork was raised into position by two mobile cranes.

On two Sundays before the major operation, possession was required by the District Engineer of the up and down lines in turn to lay temporary supports under the L.N.E.R. tracks so that the existing rivets could be cut out and replaced by bolts. On the two Sundays after, possession of the lines alternately was again required to enable the bolts with which the new steelwork was fixed to be taken out and replaced by rivets, and for a covering of asphalt to be laid on the steelwork decking of the bridge under the L.N.E.R. tracks for protective purposes.

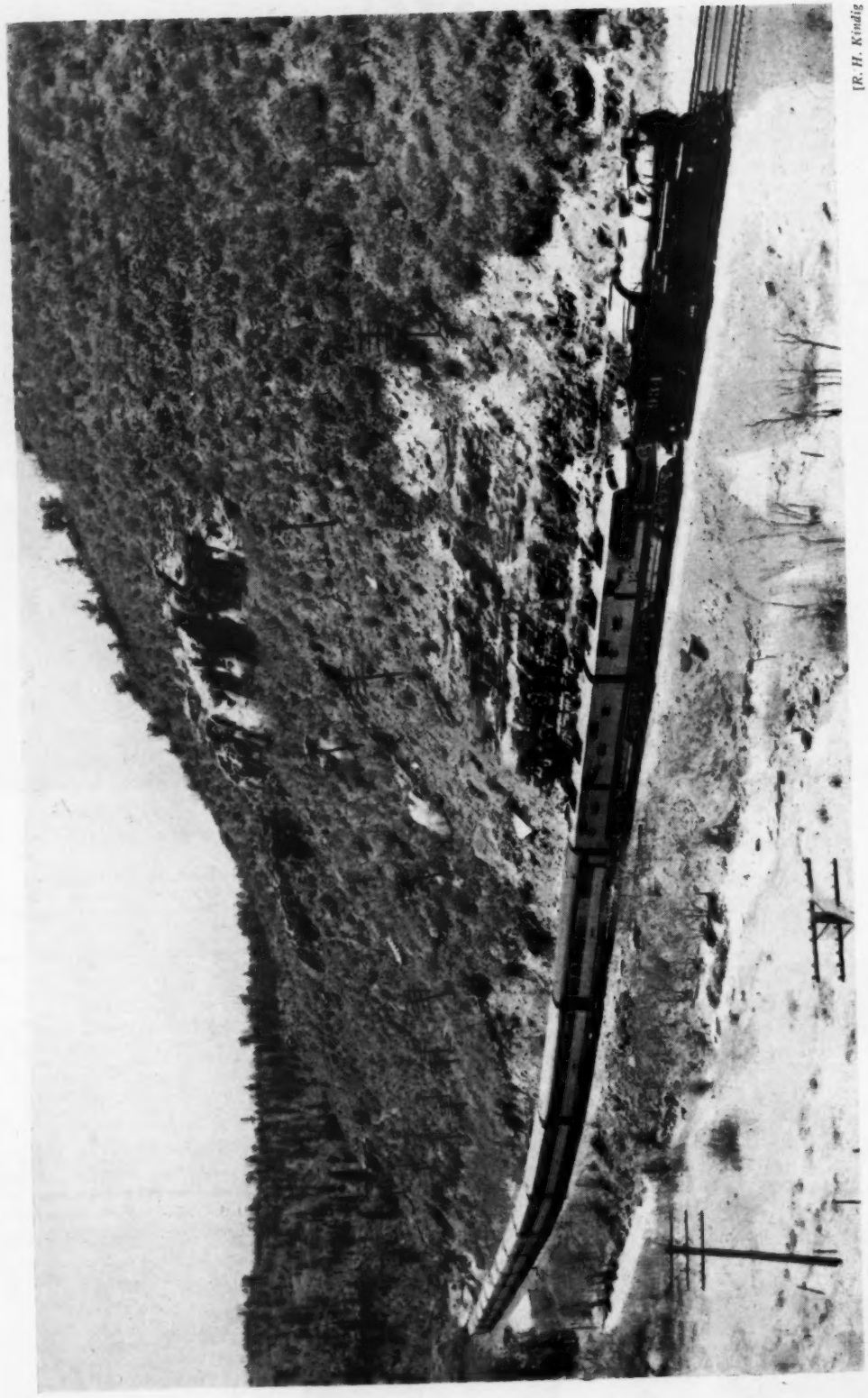
Photo] ["*Nottingham Evening News*"

View of the work in progress

Difficulty was experienced in removing two of the girders passing only two or three inches over the platform buildings of the station below, but this was overcome by lowering them very slightly and carefully working them forward until they could be lowered into wagons beneath.

In Rhodesia, as in many parts of the British Empire, women have replaced men in a number of railway occupations. The illustration shows stewardesses on a Rhodesian train

[*Photo courtesy "The Crown Colonist"*]



[R. H. Kindig

The Santa Fe diesel-powered streamline train El Capitan ascending the 1 in 28 gradient of the Raton Pass. The diesel locomotive is assisted by 2-10-2 steam locomotive No. 934

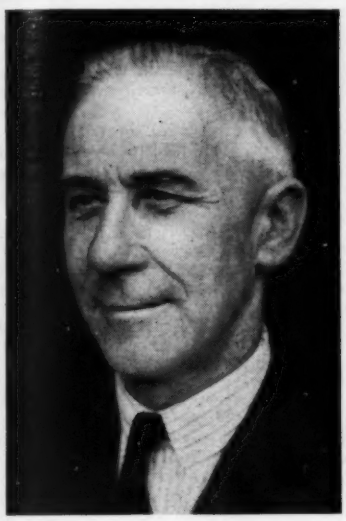
Photo]

RAILWAY NEWS SECTION

PERSONAL

The Hon. F. C. Sturrock, Minister of Railways & Harbours, Union of South Africa, has been appointed to the newly-created post of Minister of Transport for the Union. Some further details concerning the new Ministry are given on page 195.

Captain W. L. Sinclair, Assistant Marine Manager, L.M.S.R., who, as recorded in our August 6 issue, has been appointed Chief Marine Superintendent, served his apprenticeship with Thomas Law & Company, Glasgow, in its China Line of sailing ships. He then joined the Anchor Line as Junior Officer and served from Junior Officer to Master, Assistant Marine Superintendent, and Marine Superintendent. He joined the L.M.S.R. as Marine Superintendent & Harbour Master, Holyhead, in January, 1935. In July, 1937, he was transferred to Headquarters at Euston as Assistant Marine Manager, which post he now vacates. Captain Sinclair served in the 1914-19 war as Lieutenant, R.N.R., in H.M. Submarines. He is a member of the Court of the Honourable Company of Master Mariners, an Associate of the Institution of Naval Architects, and an Associate of the Institution of Engineers & Shipbuilders in Scotland.



Captain W. L. Sinclair

Appointed Chief Marine Superintendent, L.M.S.R.

Mr. S. W. Fairweather

Appointed Vice-President of Research & Development, C.N.R.

Mr. E. D. Robinson

Appointed District Engineer, Cambridge, L.N.E.R.

We regret to record the death on August 6, at the age of 71, of Mr. Wilfrid Henry Simpson, Secretary to the Derwent Valley Light Railway Company.

The late Mr. J. T. Naisby, who was Passenger Manager, North-Eastern Area, L.N.E.R., from 1927 to 1932, left £3,610.

Mr. S. W. Fairweather, who has been appointed Vice-President of Research & Development, Canadian National Railways, studied engineering at Acadia and McGill Universities, and joined the Department of Railways & Canals in May, 1916, as Assistant Engineer on the Prince Edward Island ferry terminals. He was employed later as Assistant Engineer on the Quebec Bridge; afterwards he was transferred to Ottawa, where he was attached to the Consulting Engineer for the Dominion Government. In 1919 he joined the staff of the Grand Trunk Arbitration on the Government side. In 1923 Mr. Fairweather joined the Bureau of Economics of the Canadian National Railways, serving, first, as Assistant to the Director, and, from 1930, as Director. In 1939 he was appointed Chief of Research & Development, and now becomes Vice-President. The Department of Research & Development is charged, among other matters, with the direction of the development of natural resources and of the location of industries on the system; and with the investigation of matters bearing on the more efficient use of labour and materials, and of problems of adjusting the railway's activities to changing conditions, particularly in respect of post-war developments. It will deal also with problems of road competition.

A technical sub-committee has been appointed by the Associated Road Operators, the Commercial Motor Users Association, the Municipal Passenger Transport Association, the Public Transport Association, and the Society of Motor Manufacturers & Traders, to prepare the joint representations which are being made to the Ministry of War Transport for a revision of the maximum permissible dimensions and weights of public service road vehicles. The members are as follow :—

Representing operating interests

Mr. A. F. Bentall, London Passenger Transport Board.
Major F. J. Chapple, Bristol Tramways & Carriage Co. Ltd.
Mr. A. Twidle, B.E.T. Federation Limited.
Mr. W. C. Whalley, Manchester Corporation Transport Department.

Representing manufacturing interests

Mr. J. A. Dorr, Dunlop Rubber Co. Ltd.
Mr. A. T. Froggatt, Metropolitan-Cammell-Weymann Motor Bodies Limited.
Mr. V. W. Pilkington, Leyland Motors Limited.
Mr. C. M. Simpson, Daimler Limited.

(*See editorial note, page* 174)

Dr. C. H. Desch has been appointed a Director of Richard Thomas & Co. Ltd. as from September 1. He will advise the company on matters of scientific research and development.

Mr. E. D. Robinson, Acting District Engineer, Cambridge, L.N.E.R., who, as recorded in our June 4 issue, has been appointed District Engineer, Cambridge, joined the District Engineer's Staff of the former G.N.R. at Peterborough in 1911. He served overseas with the Royal Engineers, Tunnelling Companies, in the 1914-19 war. He returned to Peterborough after the war, and in 1927 was transferred to the District Engineer's Office, Cambridge, and was engaged on the construction of the Whitemoor Marshalling Yards. In 1929 he was appointed Chief Assistant, and in 1939 became Acting District Engineer, Cambridge.

L.N.E.R. Appointment

The L.N.E.R. announces that Mr. E. J. Stephens, District Superintendent, Lincoln, has been appointed District Superintendent, Doncaster, in succession to Mr. F. J. Trotter, who is retiring from the company's service.

The late Mr. F. G. Smith, who was a Director of the Wellman Smith Owen Engineering Corporation Limited, left £33,041.

The following announcement appears in the Second supplement to *The London Gazette* of August 3, 1943 :—

Territorial Army—Royal Engineers.

Lt.-Col. Sir Ernest J. H. Lemon, Knt., O.B.E., M.I.Mech.E. (44461) resigns his commn. 7th Aug. 1943, retaining the rank of Lt.-Col.

It is announced in the Second supplement to *The London Gazette* of August 3, 1943, under the heading of "Corps of Royal Engineers," that Major E. W. Rostern, M.C., having attained the age limit of liability to

recall, has ceased to belong to the Reserve of Officers. Major Rostern, in August, 1942, was appointed Acting Superintendent, Southern Area, L.N.E.R.

L.M.S.R. Appointments

Mr. J. P. Euington, Assistant, Office of Superintendent of Organisation & Staff, Chief Commercial & Chief Operating Managers' Office, Manchester, to be Assistant to Superintendent of Organisation & Staff, Chief Commercial & Chief Operating Managers' Office, Watford H.Q., *vice* Mr. S. H. Scholes, promoted.

Mr. A. H. Madden, District Locomotive Superintendent, Accrington, to be Assistant to Operating Manager (Motive Power), Glasgow, *vice* Mr. J. Keyden, retired.

Mr. J. C. Foster, Assistant to Divisional Superintendent of Operation (Motive Power), Crewe, to be District Locomotive Superintendent, Crewe, *vice* Mr. W. E. Blakesley, transferred.

Mr. G. Phillips, District Locomotive Superintendent, Perth, to be District Locomotive Superintendent, Accrington, *vice* Mr. A. H. Madden, promoted.

Mr. W. Dunsmuir, District Locomotive Superintendent, Inverness, to be District Locomotive Superintendent, Perth.

Mr. J. Davidson, Assistant District Locomotive Superintendent, St. Rollox, to be District Locomotive Superintendent, Inverness.

Mr. W. M. Sangster, Assistant, Office of Divisional Superintendent of Operation (Motive Power), Manchester, to be District Locomotive Superintendent, Shrewsbury, *vice* Mr. J. W. Phillips, promoted.

Mr. A. E. Cassam, Goods Agent, Crewe, to be Goods Agent, Derby (St. Mary's), *vice* Mr. F. Brooks, retired.

Mr. W. E. Millard, Senior Clerk, Development Section, Chief Operating Manager's Office, Watford H.Q., to be Goods Agent, Crewe.

Mr. H. J. Stanway, Goods Agent, Gloucester, to be Goods Agent, Bristol (St. Philips) *vice* Mr. E. D. Farrar, deceased.

Mr. J. Buchanan, Goods Agent, Leith, to be Goods Agent, Edinburgh (Lothian Road), *vice* Mr. J. Cameron, retired.

Mr. W. K. Kerr, Goods Agent, Stirling, to be Goods Agent, Leith.

Mr. A. R. Yeaman, Chief Commercial Clerk, District Goods & Passenger Manager's Office, Inverness, to be Goods Agent, Stirling.

Mr. H. M. Manwaring, Chief Accounts Clerk, District Goods Manager's Office, Wolverhampton, to be Goods Agent, Great Bridge, *vice* Mr. F. D. S. Lodge, retired.

Mr. A. W. Shouler, Chief Clerk, Commercial Road, London, to be Goods Agent, Brompton & Fulham.

Mr. J. Morgan, Stationmaster, Stafford (also supervises L.N.E.R. Passenger Department interests at Stafford Town and Stafford Common Stations), to be Stationmaster, Wigan, *vice* Mr. J. Speakman, retired.

Mr. J. L. Hadfield, Stationmaster & Goods Agent, Corby & Weldon, to be Stationmaster, Stafford (also to supervise L.N.E.R. Passenger Department interests at Stafford Town and Stafford Common Stations).

Mr. J. L. Robinson, Stationmaster & Goods Agent, Mangotsfield, to be Stationmaster & Goods Agent, Corby & Weldon.

Mr. C. Hinchliffe, Stationmaster & Goods Agent, Kirkham, to be Passenger Agent, Wigan, *vice* Mr. E. A. Shervington, retired.

Mr. R. Tildesley, Assistant, Office of Superintendent of Motive Power, Watford H.Q., to be Assistant District Locomotive Superintendent, Bescot, *vice* Mr. G. Rigby, promoted.

Mr. W. Bradley, Running Shed Foreman, Preston, to be Assistant District Locomotive Superintendent, Toton, *vice* Mr. E. C. Bourne, promoted.

Mr. J. M. McCrae, Assistant District Locomotive Superintendent, Polmadie, to be Assistant District Locomotive Superintendent, St. Rollox, *vice* Mr. J. Davidson, promoted.

Mr. W. Russell, Running Shed Foreman, Hurlford, to be Assistant District Locomotive Superintendent, Polmadie.

Mr. W. H. Keys, Chemist, Derby, to be Assistant Chief Chemist & Chemist, Derby.

Mr. W. Davey, Chemist, Glasgow, to be Chemist, Crewe, *vice* Mr. G. W. Jones, retiring.

Mr. G. E. Wilson, Assistant Chemist, Derby, to be Chemist, Glasgow.

Mr. Noel G. Brookes, A.M.I.Mech.E., has been appointed Engineer to the Aldershot & District Traction Co. Ltd., an associate of the Southern Railway Company and of the British Electric Traction Co. Ltd. Mr. Brookes has been Engineer to Transport Services Limited, and, more recently, Service Manager with F. Perkins Limited; the latter position he now relinquishes.

The late Mr. C. E. Parker, formerly a Director of Thos. W. Ward Limited, left £36,024.

We regret that, in the biography of the late Mr. J. F. Gee, which appeared in our last week's issue, the dates of his appointments as Assistant Accountant, and Chief Accountant, L.N.W.R., were given as 1927 and 1929, respectively; these should have read 1917 and 1919.

Institution of Locomotive Engineers

The following applicants for membership of the Institution of Locomotive Engineers have been elected :—

Members

Messrs. F. J. Hills (Metropolitan Cammell Carriage & Wagon Co. Ltd.); J. R. G. Hudson (High Duty Alloys Limited); H. J. Potts (Crossley Bros. Ltd.); A. Williams (Superheater Company, U.S.A.).

Associate Members

Messrs. R. W. Bell (Andrew Barclay Sons & Co. Ltd.); H. R. Cox (Assistant to Locomotive Superintendent, Cardiff Valley Division, G.W.R.); B. T. Cuny (Ministry of Works & Planning); D. W. Hinde (W.A.S. Department, English Electric Co. Ltd.) J. W. Scholefield (Hunslet Engine Co. Ltd.); J. A. R. Smith (Davies & Metcalfe Limited).

Associates

Messrs. A. Hull (Stores Dept., B.A. & Pacific Railway), Stuart Miall (Associate Editor (Mechanical), *The Railway Gazette*).

Graduates

Messrs. L. Abbott (C.M.E.'s Drawing Office, L.M.S.R., Crewe); H. R. R. Farmer (Premium Apprentice, L.N.E.R. Locomotive Works, Doncaster), A. R. Grierson (Apprentice, L.P.T.B. Acton Works); M. W. Hibling (Progress Dept., L.N.E.R. Locomotive Works, Doncaster); A. G. Lloyd (Electrical Construction Dept., British Thomson-Houston Co. Ltd.); G. Owen (C.M.E.'s Drawing Office, L.M.S.R., Crewe); W. I. Roberts (C.M.E.'s Drawing Office, L.N.E.R. Locomotive Works, Doncaster); K. H. Smith (Planning Office, L.M.S.R. Locomotive Works, Derby); H. T. Thomas (C.M.E.'s Drawing Office, L.N.E.R. Locomotive Works, Doncaster).

Transfer from Associate Members to Members

Messrs. M. A. Crane (Beyer, Peacock & Co. Ltd.); T. B. Welch (Chief Mechanical Engineer, Nigerian Railway).

Transfer from Graduates to Associate Members

Messrs. F. J. Cartwright (Assistant, Works Machinery Dept., C.M.E.'s Dept., L.M.S.R. Locomotive Works, Derby); A. Webb (Motive Power Dept., L.M.S.R., Preston).

The Frontier Mail crossing Kurrong Bridge, North Western Railway (India), hauled by an "XC" class 4-6-2 locomotive of the type referred to in two articles which appeared in our issues of July 9 and July 30, respectively

TRANSPORT SERVICES AND THE WAR—203

A Railway Road Record

L.M.S.R. motor and horse vehicles are collecting and delivering 25 per cent. more merchandise than in pre-war days. In a recent four-weekly period they carted nearly 1½ million tons.

A Glimpse of War Traffic

In three days recently, the L.M.S.R. ran 42 special trains conveying Prisoners of War from ports to inland camps; 5 trains were also required to convey the returning escorts. In the same three days the L.M.S.R. ran no fewer than 277 special trains of military traffic.

Civilian Air Raid Casualties in July

The Ministry of Home Security has announced the following figures of civilian casualties due to air raids in the United Kingdom during the month of July :—

Killed (or missing believed killed)	167
Injured and detained in hospital	210

The casualties are classified as follow :—

	Men	Women	Under 16
Killed (or missing, believed killed)	59	80	28
Injured and detained in hospital...	73	104	33

Air Attacks on Transport during July

The R.A.F. monthly survey shows that there was no diminution in the fighter attacks on locomotives in Western Europe during July, despite the fact that both the R.A.F. and the U.S.A.A.F. were dealing powerful blows on other targets. Axis airfields in France and the Low Countries were bombed on an unprecedented scale, and Germany was bombed by day and night for several successive days. The following railway centres were attacked in daylight: Lille, Courtrai, Amiens, Le Mans, St. Omer (attacked on two days running), and Abbeville. Photographic interpretation after the attack on July 4 by American heavy bombers on the Le Mans marshalling yards shows direct hits at the south bottleneck, and at least four craters on the tracks in the sorting and forwarding sidings. Numbers of goods wagons have been either destroyed or severely damaged. Photographs taken after the attacks on July 9 and 10 on St. Omer show that the locomotive round house has been damaged at both ends by direct hits.

In addition to any locomotives destroyed or damaged during these attacks, about 100 locomotives were observed to have been either destroyed or badly damaged by fighters or fighter bombers. The care with which these attacks are made was exemplified by an attack on July 2. A Czech squadron leader, flying a Typhoon, saw a passenger train near St. Omer in Northern France. Knowing that he was barred by strict rule from attacking civilian passenger trains, the pilot nevertheless had a feeling that this was no ordinary train carrying French passengers. He fired a burst into a field alongside the train and watched what happened. The train stopped with a jerk, the doors were flung open, and out poured German soldiers, who scattered into ditches and hedgerows. The Typhoon pilot then turned his guns on the locomotive and left it "steaming well."

On July 3, Typhoons, Spitfires, and Mustangs were out attacking rail targets; 9 locomotives were hit, in addition to signal boxes, barges, oil tanks, factories, gun posts, a hangar, and a camouflaged bus full of Germans. Many pilots reported on the return that they had been fired on by flak guns on the goods trains which they had attacked. This is a reminder of the importance which the enemy attaches to his rail communications in Western Europe at a time when other Axis theatres of war are clamouring for flak reinforcements.

Irish Train Services and Summer Time

As a result of the discontinuance of Double Summer Time in Northern Ireland on Sunday last, August 15, numerous alterations had to be made in the train services of the Great Northern Railway (Ireland). Eire had not adopted D.S.T. The following are the principal changes :—

DUBLIN—BELFAST

Weekdays

9.30 a.m. Belfast to Dublin altered to 8.40 a.m., due Dublin 11.50 a.m.

1.30 p.m. Dublin to Belfast altered to 2.30 p.m., due Belfast 5.55 p.m.

6.45 p.m. Belfast to Dublin altered to 5.43 p.m., due Dublin 9.5 p.m.

Sundays

9.15 a.m. Dublin to Belfast altered to 10 a.m., due Belfast 1.20 p.m.

5 p.m. Dublin to Belfast altered to 4.45 p.m., due Belfast 8.35 p.m.

6.40 p.m. Belfast to Dublin altered to 5.40 p.m., due Dublin 9.10 p.m.

BELFAST—OMAGH—LONDONDERRY

Weekdays

12 noon Belfast to Londonderry altered to 11.15 a.m., due Londonderry 2.35 p.m.

Sundays

8.35 p.m. Belfast to Londonderry altered to 7.45 p.m., due Londonderry 11.10 p.m.

BELFAST—CLONES—CAVAN

Weekdays

9.10 a.m. Belfast to Clones altered to 9.25 a.m., due Clones 12.5 p.m.

8.20 a.m. Clones to Belfast altered to 8.10 a.m., due Belfast 10.55 a.m.

3.15 p.m. from Cavan (Clones 4.55 p.m.) to Belfast altered to 4.15 p.m. (Clones 5.55 p.m.), due Belfast 8.55 p.m.

Sundays

6.20 p.m. Clones to Belfast altered to 7.20 p.m., due Belfast 10.10 p.m.

DUBLIN—DROGHEDA—DUNDALK

Weekdays

12.10 p.m. Dublin to Dundalk altered to 12.40 p.m.

11.40 a.m. Dundalk to Dublin altered to 12.45 p.m.

10.10 a.m. Dublin to Drogheda (Mon. only) altered to 9.45 a.m.

1.45 p.m. Dublin to Drogheda (Mon. exc.) altered to 1.30 p.m.

10.30 a.m. Drogheda to Dublin altered to 10.26 a.m.

DUNDALK—ENNISKILLEN—LONDONDERRY

Weekdays

10.30 a.m. Dundalk to Londonderry altered to 10.40 a.m.

3.5 p.m. Dundalk to Londonderry altered to 4.10 p.m.

Coastal Area Ban

A ban imposed by the military authorities on visitors to a coastal area in southern England and two other smaller areas came into force on August 17. All hotels and boarding houses in the resorts affected have had to notify intending visitors and cancel their bookings. The only guide to other intending travellers is provided by notices in certain London railway stations. Booking office clerks and agencies are not to answer questions and the issue of a ticket implies no guarantee that a traveller will be allowed to enter his destination. Vehicular traffic and pedestrians may be prohibited from using certain roads at certain times, and the carrying of cameras, telescopes, and binoculars without a special permit is forbidden. Non-residents were given eight days' notice to leave the areas by August 16. Notices posted in the areas affected stated that permits might be granted, on application to the chief constable of the area, for business purposes, or to visit parents, children, wives or husbands, attend a wedding or funeral of a relative, visit near relatives who are ill, or aged (over 70), or in an institution, or for the purposes of treatment. Troop movements in these areas have greatly increased recently, and roads leading to them have been carrying exceptionally heavy military traffic. Army movements by rail on an equally large scale have also been taking place. Some lines may be barred to civilians.

Wartime Punctuality in the U.S.A.

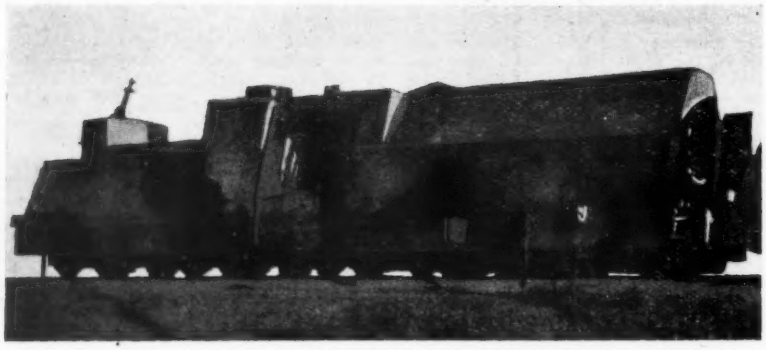
The schedules of five passenger trains on the Illinois Central Railroad were lengthened from 15 to 35 min., with correspondingly earlier departures from terminals, on July 11. The purpose of the change was to insure on-time operation in the face of increased military and other travel and the mounting volume of war freight. The schedules lengthened were those of the Creole from Chicago to New Orleans, 35 min., the Seminole from Chicago to Birmingham, 30 min., the Illini from Chicago to Carbondale, 20 min.; the Chickasaw from St. Louis to Memphis, 10 min.; and the Texas Limited from Meridian to Shreveport, 15 min. In order to maintain connections at the principal points, there were various other changes in arrivals and departures, all of which were included in the new timetable that became effective on July 11.

Guarding U.S.A. Railway Piers

The lines of the Baltimore & Ohio Railroad Company give access to east coast ports and to many points on the Delaware and North (New York) Rivers. Such valuable property requires constant surveillance in ordinary times and in wartime vigilance must be intensified. The guard is shared by B. & O. Police and U.S.A. Coast Guards. The police work three shifts daily and inspect the credentials of anyone entering the pier property at the gates on land or from boats on the water side. They even check up on the identification passes of coast guard officers and Servicemen. The coast guard maintain a watch on the pier property, working eight-hour shifts and patrolling in pairs. Ships of neutral nations tied up at any of the piers have a contingent of coast guards on board throughout the stay of the vessel to ensure that all the necessary war regulations are carried out. Ships of allied nations have their own military guard. Both police and coast guards keep particular watch to prevent fires, and hold inspections at intervals of not more than two hours apart. The two forces also share the responsibility for the B. & O. piers along the Great Lakes and on the Mississippi River at St. Louis. The test of the effectiveness of the guard may be gauged by the fact that no "incidents" have occurred to halt for one moment the flow of trains or ships.

Fuel Supply for Alaska Military Highway

A scheme has been evolved, and is well on the way to completion, for bringing oil to the fleets of lorries using the Alaska Military Highway, the aeroplanes on the Alaskan routes, and to the ships in Alaskan ports. This project has necessitated the building of a refinery and the construction of a 400-mile oil pipe, and is popularly called the "Canol" project, an abbreviation of "Canadian oil." Brig.-General James A. O'Connor, of the Northwest Service Command, is in charge of the undertaking, which has been driven through forests and frozen ground. Much of the work is already done on the pipeline itself, which when ready will bring crude oil to a refinery to be erected in the vicinity of Whitehorse. From this point other lines will extend south along the highway and



A camouflaged Soviet armoured rail unit, with anti-aircraft guns, reproduced from a German view stated to have been taken near Gshatsk, and published in the "Völkischer Beobachter"

as far north as Fairbanks. The discovery of the pass through the Continental Divide which determined the route of the pipeline is credited to Lieut. William Hammond, U.S. Army Engineers. He headed an expedition drawn by three teams of dogs and taking three toboggans loaded with 500 lb. of provisions. The journey began through the snow in weather 60 degrees below zero and in little more than a month reached Fort Norman, having found the best route for the "big pipe." Lieut. Hammond succeeded after six previous expeditions had failed. It is hoped to complete the whole scheme by the end of this year (*see editorial note, p.* 174)

Railway Activity in Paraguay

The increasing tempo of commercial activities in Paraguay is directly reflected in the railway traffic record. Imposition of petrol rationing in June, 1942, restricted road motor transport, and caused a heavier freight movement over the Paraguay Central Railway, which connects Asuncion, the capital, with the Argentine railways. During 1942, 160,167,240 kg. of freight were carried. This was 27 per cent. greater than the 1941 total, and about 41 per cent. more than the 129,203,650 kg. carried in 1939. Passengers were considerably higher, with a total of 1,555,978 in 1942, compared with 1,243,820 in 1941.

New Railway for Transylvania

The Hungarians seem to be making great efforts to develop transport in the parts of Transylvania taken from Roumania. The connecting railway link between Saratel and Deda is stated to have been opened in January last; particulars of the line (with map) appeared in our issue of July 17, 1942. Air transport in the area was recorded in our issue of March 19 last (page 310). It is now learned that an alternative railway route to the southernmost tip of Hungarian-occupied Transylvania was discussed at a meeting of the permanent Hungarian Railway Commission held in the last days of June. The new standard-gauge line would connect Targu Muresh with St. Gheorghe (which is only 20 miles to the north of Brashov), skirting the present Roumano-Hungarian frontier. From Targu Muresh it would run in a south-easterly direction to Cristur, a distance of about 50 miles. Cristur is the last Hungarian station on the Odorhei-Sighisoara branch line, the southern section of which (Cristur-Sighisoara) remained in Roumanian territory when Transylvania was divided. The northern section, from Cristur to Odorhei (17 miles) would be incorporated in the new line. The latter would proceed from Odorhei again in a south-easterly direction until it would join the Ciceu-Brashov line at St. Gheorghe. The distance between Odorhei and the latter place, *via* Okland and Barot, would be about 60 miles.

Higher Fares in Bulgaria

The effect of the 30 per cent. increase in passenger fares introduced on the Bulgarian State Railways on December 1, 1942, having been nullified by the rapidly-soaring price level of the country, a further increase of 30 per cent. was put into force on May 1, 1943. The issue of season tickets has also been discontinued, except for civil servants (for service trips only) and for regular journeys for "vital purposes" and "essential services." Fare changes which became effective on April 15 were recorded in our August 6 issue, page 141.

A general increase of goods rates is thought to be unlikely at present, but some increases were introduced on June 1, through the suspension of rebates on such categories as building and road building materials, horticultural products, and fruit.

International Through Fares

International through fares and luggage rates, operative as from March 1, 1943, between France, Switzerland, and Italy, on the one hand, and Serbia, Croatia, Roumania, Greece, and Albania, on the other, were introduced on the Bulgarian State Railways as from June 1, although Bulgaria had previously adhered to the convention. Turkey introduced these international fares and luggage rates as from May 20. As a result of this measure, most of the fares and luggage rates in force between Bulgaria and Roumania had to be altered as from June 1.

Turkish Railway Commission

With the object of relieving the increasing difficulties of handling essential food and fuel transport on the Turkish State Railways, and of co-ordinating civilian with military traffic, a special railway traffic commission was established recently at Ankara.

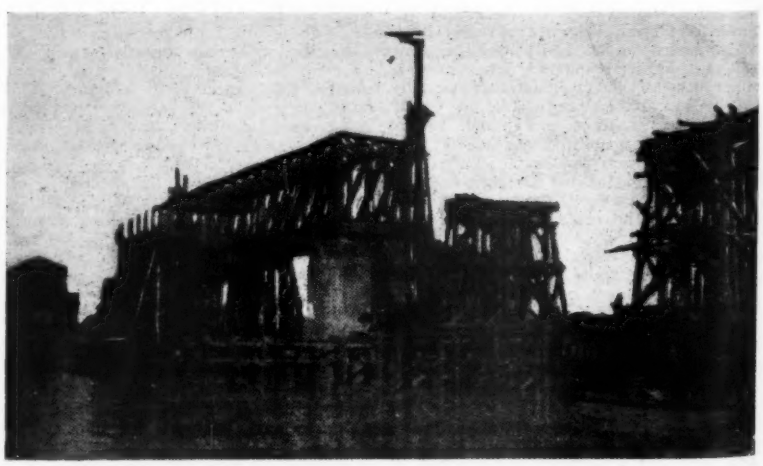
Turkish Air Traffic

Air traffic in Turkey, operated by the State Air Traffic Company—Devlet Hava Yollari—was resumed on May 1. The Ankara-Istanbul and Ankara-Adana services are flown every weekday in each direction. The line Ankara-Kaisarie-Elaziz, line, operated thrice weekly in each direction from May 1, was extended on June 16 to Van, close to the Persian border; the total distance from Ankara to Van is about 497 miles. It is intended to open a new service between Ankara and Sivas. On the other hand, there is little likelihood that the services on the Ankara-Izmir and Istanbul-Izmir lines will be resumed this summer, because of the delicate position in the Eastern Mediterranean. The principal fares are: Ankara-Istanbul, £T. 31; Ankara-Adana, £T. 35; Ankara-Kaisarie, £T. 20; and Kaisarie-Elaziz, £T. 30. Through fares are obtained by the summation of the fares of the various sections; there are no reductions for return tickets. The rate for excess luggage above the 33-lb. limit is 1½ per cent. of the fare.

Roumanian Air Traffic

The Roumanian national air traffic company L.A.R.E.S. (Liniile Aeriene Romane Exploatate cu Statul), a semi State-owned organisation, resumed the following air services early in May, operating them with its own machines: Bucharest-Galatz-Odessa; Bucharest-Sibiu-Arad; Bucharest-Cernauti; Bucharest-Jassy-Chisineu; Bucharest-Craiova-Sighisoara; and the international connection Bucharest-Budapest-Vienna-Berlin. The last-named line is worked thrice weekly in each direction.

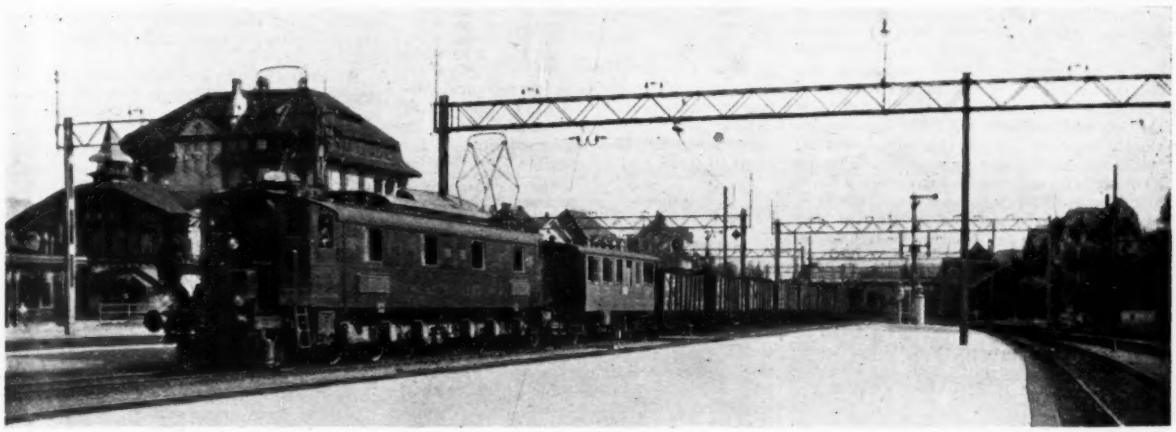
In addition, the air services between Bucharest and Milan, *via* Belgrade, Zagreb, and Venice, and between Bucharest and Athens, *via* Sofia and Salonica, were opened early in June (see also our July 23 issue page 94.)



New standard-gauge railway bridge in course of construction over the River Sava at Brod, in Croatia

German Coal Traffic to Italy

Events in Italy seem likely to disrupt one of the most remarkable international railway traffics of the war, namely, the large imports of German coal to Italy, and the necessity for the United Nations to make good the deficiency of German coal which would result from Italian collapse or Allied occupation is a matter to which close attention has been given. Although it has been generally agreed that responsibility for the operation of civilian transport facilities within any country will devolve upon the national authorities concerned, one of the main tasks of the Technical Advisory Committee on Inland Transport, under the chairmanship of Professor E. R. Hondelink, is to estimate and specify in quantities, types, and standards, the fixed and movable equipment necessary to restore inland transport in Allied-occupied territories. In the case of Italy, the supply of fuel from abroad is an equal necessity to the provision of rolling stock.



Train of empty coal trucks returning from Italy to the Ruhr, passing Spiez on the Berne-Lötschberg-Simplon Railway

Just before the war, twelve million tons of foreign coal (ten million from Germany) were imported into Italy every year. Of these about 200,000 tons were used by the railways, despite railway electrification, and the introduction of home-produced coal for heating trains, stations, and railway offices. From the beginning of the war, overland transport on a large scale from the Saar basin was attempted and carried out for a short while, until the Swiss railways found themselves unable to stand the pressure, and the exceptionally heavy goods traffic between Germany and Italy *via* the Gotthard route was reported to have ceased by October 1, 1939. The resumption of sea transport *via* Rotterdam showed that the other available railway passes (Brenner, Tarvis, Piedicolle, Postumia) directly or indirectly connecting the Italian and German railway systems, were then inadequate or unwilling to meet the additional demand. High cost and shortage of railway wagons in Germany added to the difficulties. A Swiss statement then said that, since the beginning of the war, the Swiss railways had transported 45,000 tons monthly to Italy, but that neither Switzerland nor Italy could lend wagons to Germany.

The enforcement from March 1, 1940, of British contraband control on German coal consigned to Italy, was thought to affect about two-thirds of the normal Italian imports of foreign coal. This contraband control action, which, incidentally, was taken under the Order in Council issued by the British Government on November 27, 1939, banning German exports as a reprisal against Germany's breach of international law by her unrestricted submarine campaign, revived the importance of the overland routes well before Italy herself became a belligerent. The Rome paper, *Tribuna*, wrote on February 29, 1940, that two-thirds of Italy's coal supplies from Germany reached her overland, but this was almost certainly a considerable exaggeration. Well-informed Swiss opinion at that time doubted whether more than two million tons could be carried by rail from Germany to Italy—or one-fifth of the total imports—in peacetime, and one million tons in the conditions of 1940. Reuters reported from Lucerne on March 6, 1940, that trainloads of German coal were passing daily over the Simplon and Gotthard routes, and that return loads were mainly Italian agricultural products such as fruit and early vegetables. This traffic was stated to be of sufficient volume to have caused the Swiss Federal Railways to bring all reserve locomotives into service and to engage extra staff. The *Neue Zürcher Zeitung* stated in a message from Berlin: "Anglo-Italian relations are causing great excitement in Berlin. German production is capable of supplying the 3,000,000 tons of coal offered by England, but the transport difficulty is great, as the present state of German railways makes rail transport almost unthinkable."

It was reported from Belgrade that the Jugoslav railway authorities were notified by Germany on March 6, 1940, that the Reich would henceforward be dispatching five trains daily laden with Silesian coal *via* Maribor and Ljubljana, destined for Italy. Two days later it was said that the consignments had already begun. A trade protocol was signed in Rome on March 13 between Dr. Clodius and Senator Giannini, which was claimed to envisage the overland supply by Germany to Italy of enough coal "almost to cover Italian national requirements." All six railway lines across the Alps, bearing an average of 40 to 50 trains a day, would be required to transport overland the 1,000,000 tons of coal a month which the Reich had guaranteed to supply, stated the *Popolo di Roma* on March 22, 1940. The paper added that, since Italy in February imported 510,000 tons of coal from Germany by rail, the project did not seem wholly impracticable, but its fulfilment would demand speeding up the trains and careful organisation by the Germans.

Many speculations were made in various Continental countries concerning the total of wagons and other equipment which such an effort would involve, but, as these were based on a number of estimated factors (such as the round-trip time of a wagon from the German pithead), they could scarcely be regarded as reliable. We then commented that possibly 45,000 to 55,000 wagons would be necessary, the bulk of them running on the two routes then directly under German control in trainloads at half-hourly intervals. We added that, even if great precision of working made achievable a substantial proportion of the total required supply, the intensive line occupation and enormous wagon absorption would constitute an outstanding success for the British contraband control in thus having further limited the available railway resources of the Reich, even then heavily taxed by the increased length of haul necessitated by the virtual closure of German ports near the Ruhr and Rhineland.

A day or two before Italy entered the war, a Rome message stated that during the month of May, 1940, Italy received 987,000 tons of coal by rail from Germany, and the Stefani Agency emphasised that, despite the large-scale military activities during that month in the western coal basins, Germany continued to effect regular deliveries of coal to Italy according to the fixed schedule. It seems that four main routes were used, namely, the two through Switzerland (the Berne-Lötschberg-Simplon, and the Gotthard); the Brenner, between Austria and north-eastern Italy; and the route by Tarvisio which is reached from Germany *via* Munich, Salzburg, and the Tauern tunnel, and also (more circuitously) *via* Passau and Linz. The last-named route (namely, *via* Tarvisio), is also the direct line to Italy from Poland and Czechoslovakia *via* Vienna. In addition, it was understood that a certain amount of traffic was being carried through the extreme north-west corner of Jugoslavia to Trieste and Fiume *via* Postumia, but it was reported that the Jugoslav State Railways placed a limit of five trains a day on this additional transit coal traffic. Except by the Tarvisio route, the whole of this traffic was worked in German wagons, mostly of 20-ton capacity. Italian wagons were used on the Tarvisio route and, as these were not continuously braked, a proportion of them was equipped for hand-brakesmen for

negotiating the steeply-graded line, which has gradients of as much as 1 in 50. On the Italian side of the frontier the railway is electrified between Tarvisio and Udine, but on the German side, where the trains were steam-hauled, they were double-headed with an assisting engine in rear. The German coal was not conveyed only in whole trainloads, for most goods trains between Germany and Italy had coal wagons attached. The entire coal trains were made up to some 30 wagons a train; the approximate capacity of a fully-laden coal train was thus between 500 and 600 tons. Probably more trains reached Italy mixed than ran mixed for the major portion of their journey in German territory, as the trains have to be divided on heavily-graded sections and reformed on the south side of the Alps. In these early days of the traffic, coal appears to have been off-loaded in northern Italy, as German wagons were not seen in southern Italy.

Naturally, the progress of the war has resulted in variations in the conduct of this vast coal traffic. At one period there was a marked reduction in the volume passing through Switzerland, but this was subsequently restored. After the fall of France, the Mont Cenis route became available to Germany, and also the coast route *via* Nice. Both routes have since been used, but it is believed that the greater lengths of run involved have made them to be treated as emergency reserves. Of course, the German wagon stock has been strengthened with successive conquests. The occupation of Jugoslavia placed the whole of the eastern routes under direct Axis control, and this became an important factor when the Ruhr coal output was so severely restricted by R.A.F. activities, as it facilitated the supply of coal from Silesia. Information which has reached us from various sources leads us to believe that the German undertaking to deliver approximately 1,000,000 tons of coal a month by rail has never been achieved consistently, but it seems that the average result has not been very far below the target. Something of the order of 10,000,000 tons per annum has probably reached Italy, and has enabled the industrial life of that country to be maintained. The alternative may soon be the concern of the United Nations.

Staff and Labour Matters

Railway Police Wages

The railway police are to have their rates of pay increased as from April 26, 1943, under a decision by the independent Chairman of the Railway Police Central Conference. Questions affecting the rates of pay and conditions of service of railway police are dealt with by the Railway Police Central Conference, consisting of representatives of the police and of the railway companies, which was established under the provisions of Section 67 of the Railways Act, 1921. This section also provides that in the event of disagreement between the two sides of the central conference an independent chairman shall be appointed with power to give binding decisions, such chairman to be selected by mutual agreement or, failing agreement, by the Minister of Labour.

The central conference had referred to it a comprehensive claim by the railway police for improvements in rates of pay and conditions of service. The claim was, in effect, that railway police should be paid the same rates and have the same conditions of service as those of the civil police and the central conference, having failed to agree on this claim, the matter was referred to Sir Harold Morris, K.C., who was appointed as independent chairman of the Railway Police Central Conference by the Minister of Labour & National Service. The independent chairman has decided that the railway police are to be paid the railway war advance of 20s. 6d. a week as from April 26, 1943. The railway police were already receiving a war advance of 16s. a week and will, therefore, receive a further 4s. 6d. war advance. Below are given details of other claims decided:—

RATES OF PAY

Constables	Uniform constable a week	Detective constable a week
	s. d.	s. d.
1st year	62 0	67 0
2nd ,, ...	65 0	70 0
3rd ,, ...	67 6	72 6
4th ,, ...	70 0	75 0
5th ,, ...	72 6	77 6
6th ,, ...	75 0	80 0
7th ,, ...	77 0	82 0
8th ,, ...	79 0	84 0
9th ,, ...	81 0	86 0
10th ,, ...	83 0	88 0
11th ,, ...	85 0	90 0
18th ,, ...	87 6	92 6
23rd ,, ...	90 0	95 0

A uniform constable employed on detective work to be paid while so employed at the appropriate rate on the scale for detective constables corresponding to his years of service as a constable.

Sergeants	Uniform sergeant yearly	Detective sergeant yearly
	£	£
1st year	240	250
2nd ,, ...	246	256
3rd ,, ...	252	262
4th ,, ...	258	268
5th ,, ...	264	274
6th ,, ...	270	280

A uniform sergeant employed on detective work to be paid while so employed at the appropriate rate on the scale for detective sergeants corresponding to his years of service as a sergeant.

Inspectors to be allocated by the employing company to one of the classes below and the scales of pay hereunder to apply:—

Class 3

	Inspectors yearly	Detective inspectors yearly
	£ s. d.	£ s. d.
1st year	280 0 0	290 0 0
2nd ,, ...	287 10 0	297 10 0
3rd ,, ...	295 0 0	305 0 0
4th ,, ...	302 10 0	312 10 0
5th ,, ...	310 0 0	320 0 0

Class 2

	£ s. d.	£ s. d.
1st year	320 0 0	330 0 0
2nd ,, ...	327 10 0	337 10 0
3rd ,, ...	335 0 0	345 0 0
4th ,, ...	342 10 0	352 10 0
5th ,, ...	350 0 0	360 0 0

Class 1

	£ s. d.	£ s. d.
1st year	360 0 0	370 0 0
2nd ,, ...	367 10 0	377 10 0
3rd ,, ...	375 0 0	385 0 0
4th ,, ...	382 10 0	392 10 0
5th ,, ...	390 0 0	400 0 0

A uniform inspector employed on detective work to be paid while so employed at the appropriate rate on the scale for detective inspectors corresponding to his years of service as an inspector.

All the above rates of pay are exclusive of the war advance of 20s. 6d., and are to be operative as from April 26, 1943.

Clothing Allowance

Constables, sergeants, and inspectors who are not supplied with uniform by the employing company to receive the clothing allowance given below:—

Constables	5s. a week
Sergeants	£13 yearly
Inspectors	£16 yearly

This allowance to operate from the first full pay period after July 31, 1943.

Annual Leave

Annual leave with pay to be granted:—

Constables	12 working days
Sergeants	14 ,, ,,
Inspectors	18 ,, ,,

The above periods of annual leave shall be operative as from the beginning of the next full leave period of each company after July 31, 1943.

Union Pacific Railroad Improvements

The Union Pacific Railroad, which is carrying an extremely heavy traffic over its mountainous main line westwards from Omaha, has recently introduced a number of improvements with a view to the operation of heavy loads at the highest practicable speeds. These include the purchase of a number of additional articulated locomotives, as mentioned in a recent issue of *The Railway Gazette*, and in particular of the new 4-8-8-4 locomotives of the so-called "Big Boy" class, at present the heaviest motive-power units in the United States.

The introduction of these engines made necessary the provision of new turntables, enlarged engine-houses, large-capacity wheel-drop pits, and new facilities for boiler-washing and refilling, on the 176-mile section over which these engines chiefly work, between Green River and Ogden, Wyoming. At Green River and Ogden (and also at Laramie, 251 miles east of Green River), the previous 100 ft. turntables were replaced in 1941 by new tables of the deck-girder three-point-bearing suspension type, 135 ft. long (the 4-8-8-4 locomotives are 132 ft. 10 in. long), with shallow bronze centre-bearings and a two-wheel driving truck, electrically driven, at each end. The girders, which are 5 ft. 2 in. deep at the centre, ride on a circle rail of 175 lb. per yd. crane section, continuously welded. Ingenious methods were adopted for the installation of each table with a minimum of interference to the shed work at the depots concerned; at Green River, for example, the change-over was completed in a total of 35 hr., including a rest interval of 8 hr., and during this period engines were serviced at various points in the yard, in accordance with plans previously made.

Green River Shed Improvements

The engine shed at Green River, which handles roughly 100 locomotives every 24 hr., previously had 28 stalls, of insufficient length for the 4-8-8-4 engines. Coincidentally with the turntable renewal, five stalls have been lengthened from 96 ft. to 158 ft., two to 178 ft., and a new stall 178 ft. long has been built. Sixteen additional tracks are now being lengthened to 150 ft., and this will give a total of 24 stalls under cover, all capable of housing the largest power units. A new electrically-operated drop table of 100 tons capacity serves two of the longest tracks; if the full 13 ft. top length is used, two pairs of driving wheels at 6 ft. centres can be dropped simultaneously, and an auxiliary top, 4 ft. 2 in. long, provides for the dropping of a single pair of wheels.

New Boiler Steaming Methods

A modified steaming system is employed at Green River sheds, which has reduced by from 30 to 50 per cent. the time required to wash out boilers of this large size, and to bring them back to working pressure. The main feature of the equipment is a cast-steel mixing chamber at each outlet point, called a hydraulic heater; in this steam at high temperature is mixed with the boiler refill water, raising its temperature as it enters the boiler. When locomotives arrive at the depot for the boilers to be blown down and washed out, the waste water is

used to provide washing-out water at about 130 deg. Fahr., and the waste steam to heat the water required for refilling. The waste from one to six boilers, fed into the system simultaneously, provides for washing out an equal number of boilers, and refilling them with water at 175° to 200° F. The equipment includes an insulated wrought iron storage tank, 30 ft. in dia. and 20 ft. high, with a capacity of 101,000 gal.; a wrought-iron wash-out storage reservoir 20 ft. in dia. and 20 ft. high, with a capacity of 45,000 gal.; two condensers of capacity sufficient to condense the steam from up to six boilers simultaneously, with condensing water circulated by two pumps, each of 1,000 gal. a min. capacity; four pumps of 500 gal. a min. and one of 200 gal. a min., all electrically-operated, to furnish water at 150 lb. pressure for boilers.

In refilling boilers after blow-down and wash-out, from 200 to 400 gal. are delivered from the refilling line, through the hydraulic heater, to the boiler, at a temperature of 170° to 200° F., and steam is then admitted to the hydraulic heater as the delivery of water continues. The refilling water is thus preheated to between 270° and 310° F., and gradually heats the water already in the boiler to steaming temperature. When this temperature has been reached, the water entering the boiler partially flashes into steam, and this gradually and uniformly raises the temperature of the boiler-plates, crown-sheets, staybolts, and tubes. As the water level rises, steam pressure gradually develops from the preheated water in course of delivery, and when 2 in. of water shows in the gauge glass, the engine can be moved under its own steam, without fire, from its stall to the fire-raising station outside. The fire-raising soon brings the boiler up to its working pressure. The hot-water filling line, high-pressure steam line, and boiler wash-out or blow-down line are carried overhead, with drops to each stall, where connections are made with the engines by lengths of rigid piping with flexible joints.

Railway Position in Spain

According to information from Spanish sources, a noticeable improvement in the railway-transport position has occurred in that country during the last twelve months, although the rolling stock available is far from sufficient to cope with the increased traffic. An improvement has taken place in the distribution of foodstuffs, and in the conveyance of coal, cement, and other goods in bulk. An increase in the number of locomotives and goods wagons is said largely to be responsible. Since early last year, efforts to add locomotives and wagons to stock, and to accelerate repairs, have been intensified; and the tendency has been increased to standardise various types, thus facilitating production and repair work, due largely to the unification of the former broad-gauge railway companies into the National System of Spanish Railways.

The State Council for the Co-ordination of Transport is said to have been successful in bringing about a better utilisation of rolling stock. The general easing of the railway-transport position is responsible for the recent relaxation of certain limitations in respect of the conveyance of small consignments and express goods. These limitations had been introduced as a result of the shortage of rolling stock to give priority to important commodities; their practical outcome was an almost complete cessation of those types of traffic.

L.M.S.R. Coronation Scot Train as Living Quarters for U.S. Army Officers

The L.M.S.R. Coronation Scot train which was sent to America in January, 1939, for exhibition, and was seen by some 3,189,000 persons during its 3,121-mile tour of the United States before being exhibited at the World Fair in New York in April, 1939, was presented to the United States Army in June last. The train is being used as living quarters by officers of the Quartermaster Corps. It was decided to leave the train in the U.S.A. at the outbreak of war, but its streamline locomotive was subsequently brought back to this country. The L.M.S.R. crew, which accompanied the train on its tour, returned in 1939. A deed transferring the train to the U.S. Government was executed by Mr. R. B. White, President of the Baltimore & Ohio Railroad, acting as agent for the London Midland & Scottish Railway.

Above: The L.M.S.R. Coronation Scot train at Jeffersonville, Indiana, where it has been stationed as living quarters for U.S.A. Army officers of the Quartermaster Corps. The train is composed of a first class coach, lounge, dining car, sleeping saloon, kitchen, and third class dining car. The kitchen can provide over 200 meals at a sitting

Right: An impression of the comfortable quarters afforded by the coaches in their present use

Notes and News

Hadfields Limited.—An interim dividend is declared of 7½ per cent. (same).

Davies & Metcalfe Limited.—The directors have declared an interim dividend of 3 per cent., the same as a year ago.

Italian Travel Bureau Limited.—This company is among those recently struck off the register of companies and is thereby dissolved

Indian Railway Broadcast.— Sir Arthur Griffin, General Manager of the North Western Railway (India), broadcast a talk on the All-India Radio on the evening of July 7; his subject was "Work More."

Argentine Maize Crop.—Estimates made by the Statistical Department of the Argentine Ministry of Agriculture show that the country's 1942-43 crop of maize should amount to 1,943,000 tons, which represents a reduction of nearly 8,000,000 tons compared with the previous year.

Greenwood & Batley Limited.—In the report for the year to March 31, 1943, it is stated that the balance brought forward was £32,454, the trading profit (after E.P.T.) was £150,345 (£148,718), and the profit after making provision for taxation and other charges was £110,098. Transfers of £31,000 were made for depreciation of plant and buildings, and of £19,000 for contingencies. Preference dividends for the year absorbed £7,028, and the ordinary dividend of 15 per cent. for the year required £109,286, leaving £33,266 to be carried forward.

Indian Rolling-Stock Orders.—The Indian Railway Board proposes to provide Rs. 12 crores for the purchase or manufacture of rolling stock during 1944-45; this will include the acquisition abroad of 200 broad-gauge, and 50 metre-gauge, engines. It is stated that a number of metre-gauge locomotives were received recently from the United States, under Lease-Lend arrangements; and that 40 broad-gauge mineral locomotives are expected shortly to arrive from Canada.

W. & T. Avery Limited.—Net profit for the year at £138,150 compares with £130,407 for the previous year, and is arrived at after making full provision for taxation. After adding the amount brought forward and deducting preference dividends and the interim ordinary dividend, the surplus available for disposal is £176,306. The final ordinary dividend is 10 per cent., less tax, making 15 per cent., less tax, for the year. To general reserve is added £10,000, making that reserve £380,000; a sum of £45,000 is placed to contingency (war) reserve, increasing it to £160,000; and £10,000 is transferred to pensions fund reserve, leaving £66,818 to be carried forward.

Millars' Timber & Trading Co. Ltd.—The directors' statement circulated with the recent report shows that trading, which was fairly well maintained during the first half of 1942, became increasingly difficult as the year progressed. With the Japanese threat to Australia, the Timber Controller in that country practically prohibited the export of all timber on the grounds that it was urgently required for Australia's own defence purposes. This action was accompanied by rigid price-control, which did not take into account the large war-time increase in cost of production. Strong representations had been made to the appropriate authorities, and it was hoped that some measure of relief might be granted. The ban on exports also had an effect on the company's trade in other parts of the world where it sold its Australian timbers. The position was made worse by lack of shipping space for other timbers and commodities in which the company dealt in various parts of the world, and was further aggravated by a number of its markets being in enemy-occupied territory.

Safety Awards.—Bus drivers in the Tilling group of companies have won 1,901 awards in the Safe Driving Competition of the Royal Society for the Prevention of Accidents. In view of metal restrictions, the actual medals and bars will not be presented until after the war, when 476 drivers will be given silver medals (5 years of accident-free driving); 442, bars to silver medals (6-7 years); 279, gold medals (10 years); 215, oakleaf bars (11-14 years); and 88, brooches (15 years accident-free). Four hundred men get diplomas (1-4 years).

A. C. Wickman Limited.—Profit for the year 1942, after providing for income tax and E.P.T. was £42,317 (£33,180). Adding £29,267 brought forward makes £71,584. Deducting allocations of £3,967 to capital redemption reserve fund, of £5,000 to general reserve, of £7,610 for preference dividends, and of £6,875 for interim ordinary dividend of 5 per cent., there remains £48,132. The final dividend on the ordinary shares is 7½ per cent. less tax, making 12½ per cent. for the year, and the amount to be carried forward is £37,819.

Nationalisation of Spanish Railway Securities.—In a circular issued in Madrid by Instituto Español de Moneda Extrajera, holders of shares or debentures in the railways taken over by the State under the Law of January 24, 1941, who are resident or situated in countries other than Spain, are reminded that, by article 16 of the Ministerial Order of March last (see *The Railway Gazette* of May 14, page 477) the conversion of such securities can be effected only through the institute, to which, in the first instance, application should be made.

Peter Brotherhood Limited.—Profits for the year ended March 31, 1943, after providing for all outgoings including income tax and E.P.T., were £48,873, which with £128,448 brought forward, makes £177,321. The directors have written off A.R.P. suspense £7,593, have provided £1,500 for premiums under the War Damage Act, and £10,000 for special repairs and renewals and have set aside £5,000 as a provision towards a staff superannuation scheme. The dividend on the ordinary shares is maintained at 20 per cent. for the year and £131,190 is carried forward.

Irish Railway Wages.—A combined application by the National Union of Railwaymen, the Railway Clerks' Association, and the Associated Society of Locomotive Engineers & Firemen, for increases in salaries and wages estimated to cost £120,000 per annum, is to come before the Irish Railway Negotiating Committee at the Railway Clearing House, Kildare Street, Dublin, to-day (August 20). The application primarily affects those employees of the Great Northern Railway (Ireland), the L.M.S.R. (Northern Counties Committee), the Belfast & County Down Railway, the County Donegal Railways Joint Committee, and the Dundalk, Newry & Greenore Railway, whose home stations are in Northern Ireland.

B.E.T. Omnibus Services Limited.—This company was incorporated on June 26, 1942, for the purpose of acquiring approximately one-half of the undertaking of Tilling & British Automobile Traction Limited, under a scheme for the reconstruction and voluntary winding up of that company. The consideration for the acquisition was the issue to shareholders of the Tilling & British Company of 200,000 fully-paid 10 per cent. cumulative preference shares of 10s. each and 4,000,000 fully-paid ordinary shares of 10s. each. The whole of the authorised share capital of the company was issued in this way. The accounts for the period from June 26, 1942, to June 30, 1943, show a profit of £153,598, of which £10,000 is appropriated to a 10 per cent. dividend for the period, subject to income tax, on the cumulative preference shares, and £130,000 to a 6½ per cent. dividend for the period, free of income tax, on the ordinary shares, leaving £13,598 to be carried forward.

L.N.E.R. Contributions to "Penny-a-Week" Fund.—Between March and June last contributions by L.N.E.R. staff

British and Irish Railway Stocks and Shares

Stocks	Highest 1942	Lowest 1942	Prices Aug. 13, 1943	Rise/Fall
G.W.R.				
Cons. Ord. ...	58	39	61½	+ ½
5% Con. Pref.	115½	105½	112	—
5% Red. Pref. (1950)	109½	103½	107	—
5% Rt. Charge	133⅜	123⅜	126½	—
5% Cons. Guar.	130⅜	121½	123½	—
4% Deb. ...	117	105	109	—
4½% Deb. ...	118	108	110½	—
4½% Deb. ...	125	113	118½	—
5% Deb. ...	137	127	129	—
2½% Deb. ...	77	70	75½	—
L.M.S.R.				
Ord.	28½	16⅜	32⅜	— ½
4% Pref. (1923)	63½	50½	62½	+ ½
4% Pref. ...	76½	67½	75	—
5% Red. Pref. (1955)	103⅜	94⅜	103½	—
4% Guar. ...	104⅜	97½	100	—
4% Deb. ...	108⅜	101½	104½	—
5% Red. Deb. (1952)	111	107½	109½	—
L.N.E.R.				
5% Pref. Ord.	9⅜	2⅞	9⅞	— ⅛
Def. Ord. ...	5	1⅜	4½	— ⅛
4% First. Pref.	62	49½	62	+ ½
4% Second Pref.	32½	18½	33½	— ½
5% Red. Pref. (1955)	95½	79	96½	—
4% First Guar.	98	88	97½	—
4% Second Guar.	90	78	90½	—
3% Deb. ...	85	76	80½	—
4% Deb. ...	106⅜	100½	103	—
5% Red. Deb. (1947)	106	103	104	—
4½% Sinking Fund Red. Deb.	106	102½	105½	—
SOUTHERN				
Pref. Ord. ...	77	61½	78	+ 2
Def. Ord. ...	23½	14½	25	+ ½
5% Pref. ...	112⅜	104	111	—
5% Red. Pref. (1964)	110⅜	105½	112½	—
5% Guar. Pref.	131	121½	123½	—
5% Red. Guar. Pref. (1957)	115½	109½	113½	—
4% Deb. ...	116	104½	108	—
5% Deb. ...	134	125½	129½	—
4% Red. Deb. (1962-67)	110⅜	106	107½	—
4% Red. Deb. (1970-80)	111	106½	107½	—
FORTH BRIDGE				
4% Deb. ...	109 7/16	108	106	—
4% Guar. ...	105½	100	104½	—
L.P.T.B.				
4½% "A" ...	122½	111	117½	—
5% "A" ...	131½	122	127½	—
3% Guar. (1967-72)	95⅜	97½	99	—
5% "B" ...	121	111½	115½	—
"C" ...	56½	38	70	—
MERSEY				
Ord.	27½	20½	32	—
3% Perp. Pref.	61⅛	56½	61	—
4% Perp. Deb.	102⅜	99⅜	103	—
3% Perp. Deb.	80½	76	78	—
IRELAND				
BELFAST & C.D.				
Ord.	9	4	9	—
G. NORTHERN				
Ord.	29¾	12½	17½	+ ½
G. SOUTHERN				
Ord.	25	10	10½	+ ½
Pref.	29	12⅜	16	—
Guar.	53	35½	32	— 3
Deb.	71½	55½	57	— 2

§ ex-dividend

of all grades to the Red Cross "Penny-a-Week" Fund increased by nearly 70 per cent., and at present the total contributions of the staff are at the rate of £45,000 a year. Lord Southwood, Chairman of the fund, has written to Sir Charles Newton, Chief General Manager of the L.N.E.R., expressing his appreciation of this achievement.

County of London Plan Exhibition.—In view of the interest shown by the public, the period of the County of London Plan Exhibition at County Hall is extended until August 28.

French National Railways.—The official German news agency from Paris states that gross revenues of the French National Railways in May last were fr. 458 million, compared with fr. 483 million during the month of April; the revenues for the month of May last year were exceeded.

Yangtze Railway Tunnel.—It is reported that construction of the tunnel under the Yangtze River to connect Nanking with Pukow is to be carried out by the Central China Railway at an estimated cost of 70,000,000 yen. Reference to this tunnel was made in our July 23 issue, page 84.

Permanent Way Institution.—A meeting of the Manchester & Liverpool Section will be held in the St. John Ambulance Hall, Chapel Walks, Preston, on August 28 (amended date), at 2.30 p.m., when, at the conclusion of other business, a lantern lecture on "How the Forth Bridge was Built" will be given by Mr. P. H. Stirzaker, A.M.I.Struct.E., of Manchester.

Road Accidents in Eire.—Twenty people were killed in road accidents in Eire during the quarter ended June 30 last, half as many as in the corresponding quarter of 1942. In the same period 337 persons were injured, compared with 421 in 1942. In Dublin five persons were killed, compared with eight in the corresponding quarter of 1942, and 84 were injured, compared with 135.

Entre Rios Railways Co. Ltd.—The directors have decided to pay on September 16 a further six months' arrears of interest (for the period ended September 30, 1941) on the 4 per cent. debenture stock of the company together with 5 per cent. per annum interest on such arrears provided for under the moratorium scheme, the total amounting to £2 3s. 11d. per cent. less income tax.

South African Ministry of Transport.—A message from our correspondent in South Africa states that a Ministry of Transport has been established in the Union, embracing railways, harbours, road transport, shipping, and civil aviation. The Minister of Transport is the Hon. F. C. Sturrock, formerly Minister of Railways & Harbours. Two other ministries (Economic Development, and Welfare & Demobilisation) also have been established.

Stephenson Clarke & Associated Companies Limited.—The profit and loss account for the year to March 31, 1943, shows that the profits of trading, wagons, and ships (after charging management salaries and other administration expenses), and dividends and interest from subsidiary companies and other investments amounted to £678,720. Deducting £140,504 for depreciation, etc., leaves £538,216. Debenture charges absorb £74,698, and provision for taxation takes £235,000, leaving £228,518 as the profit for the year, to which has to be added £133,370 brought forward, making £361,888. Transfers are made of £25,000 to reserve for contingencies and of £50,000 to general reserve. Dividends, less tax, on the 12 per cent. cumulative preference shares take £40,500, and two interim dividends, less tax, have been paid on the ordinary shares, making together 12½ per cent. No further distribution on account of the year 1942-43 is proposed, leaving £152,638 to be carried forward.

Leeds Corporation Light Railways.—The Minister of War Transport has made the Leeds Corporation Light Railways (Extension of Time) Order, 1943 (S.R. & O. 1943, No. 1083), extending by three years the time limited by Section 5 of the Leeds Corporation Light Railways (Extension) Order, 1935, as last extended by the Leeds Corporation Light Railways (Extension of Time) Order, 1940, for the completion of the light railways authorised by Section 3 of the Order of 1935.

Great Southern Railways Company.—The directors on August 11 had the accounts before them for the half-year ended June 30 last. It was decided that the question of payment of dividends on the 4 per cent. guaranteed preference stock, and on the preference and ordinary stocks be deferred until the accounts for the whole year are available. In February last it was announced that no dividend was to be paid on the guaranteed preference stock for 1942 or 1941 because of the financial position of the company.

Vasco-Asturiana Railway in 1942.—The report for 1942 of this Spanish railway company records a further increase in traffic, the number of passengers having risen from 2·6 million to 3·2 million. Receipts from goods traffic increased to 12·3 million pesetas, from 9·2 million pesetas in 1941. Total earnings amounted to 15·8 million pesetas, and working expenses to 11·9 million pesetas; the operating ratio was 75·64 per cent. A dividend of 7 per cent. was declared. The company owns and operates a metre-gauge railway of 105 km. (65 miles) in the Asturias region of northern Spain.

Valencia Tramway & Railway Company.—The report for 1942 of the Spanish concern, Compañia de Tranvias y Ferrocarriles de Valencia, shows total earnings of 12·9 million pesetas, of which 10·2 million pesetas was from tramway working, and 2·26 million pesetas from the railways. After accounting for working expenses and financial charges, a balance remained of 7·5 million pesetas, and a dividend of 10 per cent., free of tax, was declared. The dividend is paid in the form of an issue of shares. There was a considerable increase in traffic during the year under review, when 130·6 million passengers were carried on the company's tramways, and 15·7 million on the railways. The report refers to the projects in hand for extensions and improvements, especially the doubling of track on the Paterna and Moncada lines. Reference is made also to the scheme for an underground railway in the city of Valencia, surveys for which are being made.

Wagon Building in Spain.—Auxiliar de Ferrocarriles, the most important Spanish wagon-building concern, returned a net profit for 1942 of 3,960,000 pesetas. Including the balance from the preceding year, a sum of 4,900,000 pesetas was available for distribution. A dividend of 6 per cent., equivalent to 3,000,000 pesetas was paid, and the balance was allocated to taxation and other reserves. Depreciation amounted to 2,140,000 pesetas. Difficulties in respect of supply of certain materials—mainly iron and steel—prevented some of the orders placed by the National Railways from being completed to schedule; but 1,409 wagons were delivered, the majority of which were for the National Railways. In addition, 618 wagons underwent heavy repairs. The new railway shops of the company at Madrid began work in 1942; and the Irún branch works are being extended.

Southern Railway "Wings for Victory" Total.—Complete figures for the Southern Railway staff's "Wings for Victory" campaigns show a total of £141,870 17s.

Collision at Crossing.—Three people were killed and several injured when the lorry in which they were travelling on the night of August 13 collided with the gates at Lincoln Road crossing, East Markham, Notts., and was caught by an express train.

London Transport Station Gardens Competition.—Ticket Collector Ernest Walker, of Ladbroke Grove Station, has won first prize for the best station garden on the Metropolitan Line. He also takes first prize for the best garden on all London Transport railways. This result is particularly creditable because the depth of earth at this station is only a few inches. Mr. Walker won a second prize last year. First prize-winners on the other lines are: Northern Line, Depot Motorman Frederick Pryke, Golders Green Depot; District Line, Machinist Charles Andrews, Ealing Common Station. Mr. Andrews has won a first prize two years running. There are 41 gardens at or near London Transport stations and, at several, vegetables are being cultivated as well as flowers, to help the war effort.

Powell Duffryn Associated Collieries Limited.—Profit for the year ended March 31, 1943, was £571,946 (£567,488) after providing for taxation and debenture service. Adding £118,620 brought forward makes £690,566. The directors have again transferred £150,000 to general reserve, leaving £540,566. Dividend on the 4¾ per cent. cumulative preference stock for the year required, less tax, £83,125, and an interim distribution, amounting to £90,000, has been paid to holders of the participation shares, leaving £367,441. A final distribution on the participation shares was made on July 31, amounting to £235,000, making a total for the year of £325,000 to be divided between the company and Welsh Associated Collieries Limited in appropriate proportions, and leaving £132,441 to be carried forward. The company has acquired the whole of the issued share capital of Cory Bros. & Co. Ltd., at a purchase price, subject to minor adjustments, of £1,750,000.

Contracts and Tenders

Below is given a list of orders placed recently by the Egyptian State Railways:—

P. & W. MacLellan Limited: Steel bars.
T.N. 2 Stores: Wire, cadmium copper.
Howell & Co. Ltd.: Steel tubes.
Doulton & Co. Ltd.: Insulators.
Sentinel Waggon Works (1936) Limited: Spares for diesel pumping set.
Davies & Metcalfe Limited: Spares for diesel pumping set.
Ruston & Hornsby Limited: Spares for diesel pumping set.
North British Locomotive Co. Ltd.: Cylinders.
I.C.I. Metals Limited: Copper bars.
Callender's Cable & Construction Co. Ltd.: Wire.
John Oakey & Sons Ltd.: Abrasives.
Durex Abrasive Limited: Abrasives.
J. E. Dalton & Co. Ltd.: Abrasives.
Carborundum Co. Ltd.: Grinding wheels.
Caprotti Valve Gears Limited: Ball bearings.
British Insulated Cables Limited: Wire.
Thomas De La Rue & Co. Ltd.: Insulating metals.
Norton Grinding Wheel Co. Ltd.: Grinding wheels.
Steel Co. of Scotland Ltd.: Tyres and axles
Yorkshire Patent Steam Wagon Company; Valves.

Railway Stock Market

Quieter conditions have ruled in most sections of the stock and share markets, and the tendency has been for values to ease in the absence of further expansion in demand. On the other hand, there were again individual features of strength among industrial shares on hopeful views of post-war prospects. Although the recent strong advance in prices attracted profit-taking sales, this was not heavy and the general undertone was good, although less buoyant than a week ago. Business in home railway stocks became less active in accordance with the prevailing tendency, and after their recent upward movement they have shown a partial reaction. Nevertheless, the attractiveness of yields on the junior stocks, the position as to dividends, and the tendency for more encouraging hopes to develop concerning the outlook after the war, are factors which suggest reasonable prospects of the upward trend in values being resumed when markets again show a strong advance. It is true that because of the usual tendency for Stock Exchange markets to attempt to discount the future a long way ahead, the disposition is for views as to the post-war position to have a much stronger influence on all classes of equity securities than the question of the immediate dividend yield. Nevertheless, there appears no justification for home railway junior stocks being valued on a substantially higher yield basis than industrial securities, bearing in mind that it is not possible to form definite views as to the post-war outlook for many industries, particularly as much will depend on factors which it is difficult to assess at this stage and also the extent Government controls and regulations are continued after the war. In the case of the railways it would seem that there are reasonably good prospects of dividends around current rates being paid until the existing financial agreement is followed by a final decision as to transport organisation after the war. Attractive yields are also obtainable on prior charges and senior preference stocks, when compared with the return on other high-grade investments. The yield on L.M.S.R. senior preference stock, for example, is fully 5¼ per cent., which must be considered as generous, bearing in mind the good cover for dividend requirements.

Compared with a week ago, Great Western ordinary has reacted from 62½ to 61½ at the time of writing; the 5 per cent. preference at 111½ showed a decline of half-a-point on balance, while the guaranteed stock and 4 per cent. debentures were maintained at 123½ and 109 respectively. L.M.S.R. ordinary reacted from 33⅜ to 32⅜, and the senior preference was 75¼, compared with 75½, and the 1923 preference 62, compared with 62½. L.M.S.R. guaranteed remained at 99½, the 4 per cent. debentures at 105, and the 5 per cent. debentures at 109½. In accordance with the general tendency in junior stocks, L.N.E.R. second preference moved back from 34½ to 33½; the first preference after reacting to 61¾ rallied to 62 and was unchanged on balance. L.N.E.R. first guaranteed remained at 97½; the second guaranteed eased to 90. Southern deferred was lower at 25, compared with 25⅜, but the preferred showed a small improvement from 77½ to 78. Elsewhere, London Transport "C" lost part of its recent good advance, and was 68½, compared with 71 a week ago, although the view prevails that after the war there will be reasonable possibilities of a better dividend on this stock.

There was an improved tendency in Argentine railway securities, and various gains were recorded among debentures and preference stocks. Sentiment tended to be influenced by the recent assurances by President Ramirez as to the policy of the Argentine Government. Entre Rios issues were firm on the announcement of the further half-year's distribution on the 4 per cent. debentures, which brings payments up to September 30, 1941. Brazilian railway stocks were also better in some cases: San Paulo ordinary was 59 and Leopoldina debentures 53. Further gains have been shown in French railway sterling bonds. Canadian Pacifics were fractionally lower at 16¼.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ending	Traffic for week: Total this year	Traffic for week: Inc. or dec. compared with 1941/2	No. of Weeks	Aggregate traffics to date: Totals 1942/3	Aggregate traffics to date: Totals 1941/2	Aggregate traffics to date: Increase or decrease	Shares or stock	Prices: Highest 1942	Prices: Lowest 1942	Prices: Aug. 13 1943	Yield % (See Notes)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	8.8.43	20,470	+ 5,620	31	873,260	677,840	+ 195,420	Ord. Stk.	14	7⅞	14½	Nil
	Argentine North Eastern	753	7.8.43	15,390	+ 2,472	5	74,898	74,142	— 756	"	6¼	3	7	Nil
	Bolivar	174	July, 1943	4,991	+ 1,021	31	37,405	31,401	+ 6,004	6 p.c. Deb.	19½	10	20½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds	20½	9	20½	Nil
	Buenos Ayres & Pacific	2,807	7.8.43	76,800	— 4,200	6	434,400	473,220	— 38,820	Ord. Stk.	7⅜	4	6	Nil
	Buenos Ayres Great Southern	5,080	7.8.43	149,760	+ 31,500	6	735,360	686,340	+ 49,020	Ord. Stk.	12¼	7⅛	13	Nil
	Buenos Ayres Western	1,930	7.8.43	44,280	— 2,280	6	242,700	265,320	— 22,620	"	12½	6	12	Nil
	Central Argentine	3,700	7.8.43	125,721	+ 8,931	6	643,032	681,504	— 38,472	"	9½	4¼	8½	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	3¾	2½	4	Nil
	Cent. Uruguay of M. Video	972	7.8.43	29,697	+ 10,809	6	164,749	116,867	+ 47,882	Ord. Stk.	8	4	5½	Nil
	Costa Rica	262	June, 1943	22,313	+ 2,732	45	196,140	247,801	— 51,661	Stk.	16½	11	14	Nil
	Dorada	70	July, 1943	26,425	+ 9,165	28	146,917	98,475	+ 48,442	1 Mt. Db.	90½	89	94½	6⅝
	Entre Rios	808	7.8.43	23,364	+ 5,910	6	103,830	94,962	+ 8,868	Ord. Stk.	33	4½	7	Nil
	Great Western of Brazil	1,030	7.8.43	14,000	+ 3,500	31	485,400	316,000	+ 169,400	Ord. Sh.	9/-	9/-	40/-	Nil
	International of Cl. Amer.	794	June, 1943	$391,995	+ $62,010	24	$3,904,639	$3,689,137	+ $215,502	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	1½	5/3	1½	Nil
	La Guaira & Caracas	22¾	July, 1943	7,550	+ 600	30	61,140	44,940	+ 16,200	5 p.c. Deb.	11½	5	83¼	Nil
	Leopoldina	1,918	7.8.43	36,290	+ 6,241	31	1,054,637	911,191	+ 113,446	Ord. Stk.	6¾	3⅛	5¾	Nil
	Mexican	483	7.8.43	ps. 337,600	+ ps. 58,900	5	ps. 2,157,100	ps. 1,727,100	+ ps. 430,000	Ord. Stk.	1	⅜	1½	Nil
	Midland Uruguay	319	June 1943	15,163	+ 300	52	184,706	167,328	+ 17,378	—	—	—	—	—
	Nitrate	382	31.7.43	8,695	— 1,070	29	86,278	109,566	— 23,288	Ord. Sh.	77/	3⅛	76/3	Nil
	Paraguay Central	274	6.8.43	$5,673,000	+ $1,981,000	6	$28,436,000	$21,272,000	+ $7,164,000	Pr. Li. Stk.	53	40	72½	8⅜
	Peruvian Corporation	1,059	June, 1943	104,734	+ 22,552	52	1,045,065	915,630	+ 129,435	Pref.	19⅜	5⅛	15	Nil
	Salvador	100	May, 1943	c 103,000	— c 3,000	46	c 1,137,000	c 959,172	+ c 177,828	—	—	—	—	—
	San Paulo	153½	1.8.43	55,367	+ 14,205	31	1,254,342	1,120,530	+ 133,812	Ord. Stk.	59	41	59	3⅜
	Taltal	160	July, 1943	3,515	— 2,975	33	52,326	62,400	— 9,674	Ord. Sh.	41/-	23/-	30/-	Nil
	United of Havana	1,301	7.8.43	51,573	— 4,297	6	274,634	222,119	+ 52,515	Ord. Stk.	8½	2½	5½	Nil
	Uruguay Northern	73	June, 1943	1,438	+ 399	52	17,255	14,305	+ 2,950	—	—	—	—	—
Canada	Canadian Pacific	17,034	7.1.43	1,132,600	+ 165,400	31	33,707,200	29,599,000	+ 4,148,200	Ord. Stk.	16¾	9⅞	16	Nil
India†	Barsi Light	202	30.6.43	17,835	+ 4,928	13	63,075	39,600	+ 23,475	—	—	—	—	—
	Bengal & North Western	2,090	Nov., 1942	264,975	— 33,087	8	449,400	561,082	— 111,682	—	—	—	—	—
	Bengal-Nagpur	3,267	Feb., 1943	932,775	+ 84,975	46	10,031,400	9,111,000	+ 920,400	Ord. Stk.	102½	88	102½	3⅜
	Madras & Southern Mahratta	2,939	30.4.43	286,500	+ 48,748	4	840,375	681,698	+ 158,677	"	105½	87	107½	6⅜
	Rohilkund & Kumaon	571	Nov., 1942	555,750	+ 5,072	8	115,950	99,909	+ 16,041	"	—	—	—	—
	South Indian	2,349	20.5.43	189,379	+ 5,937	6	975,109	890,602	+ 84,507	"	103½	88½	103½	4⅜
Various	Egyptian Delta	—	10.6.43	13,955	+ 52,968	10	98,431	75,685	+ 19,746	Prf. Sh.	5½	1½	2½	Nil
	Manila	—	—	—	—	—	—	—	—	B. Deb.	44	35	37½	9⅜
	Midland of W. Australia	277	30.6.1943	37,349	+ 12,545	52	392,864	254,759	+ 38,105	Inc. Deb.	95	90	100	6
	Nigerian	1,900	24.4.43	67,398	+ 15,900	2	246,144	191,234	+ 54,910	—	—	—	—	—
	South Africa	13,291	19.6.43	880,625	+ 84,639	11	9,556,435	8,658,995	+ 897,440	—	—	—	—	—
	Victoria	4,774	Jan., 1943	1,480,058	+ 169,521	—	—	—	—	—	—	—	—	—

Note. Yields are based on the approximate current prices and are within a fraction of ¼

† Receipts are calculated @ 1s. 6d. to the rupee

Argentine traffics are given in sterling calculated @ 16¼ pesos to the £

§ ex dividend